FACT BOOK

NAVAL RESEARCH LABORATORY

Washington, D.C. 20375

MARCH 1974

Report Documentation Page

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This document has been prepared as
a reference source of factual information
about the Naval Research Laboratory.

March 1974

The Naval Research Laboratory has a continuing need for physical scientists, mathematicians, engineers, and supporting personnel. Vacancies are filled without regard to race, creed, color, sex, or national origin. Information concerning current vacancies will be gladly furnished upon request. Address all such inquiries to the Personnel Office (Code 1800), Naval Research Laboratory, Washington, D.C. 20375.

CONTENTS

Aerial view of the Naval Research Laboratory main site

The Naval Research Laboratory

MISSION

To conduct a broadly based multidiscipline program of scientific research and advanced technological development directed toward new and improved materials, equipment, techniques, systems, and related operational procedures for the Navy. In fulfillment of this mission, the Naval Research Laboratory:

(a) Initiates and conducts scientific research of a basic and long-range nature in scientific areas of special interest to the Navy.

(b) Conducts exploratory and advanced technological development deriving from or appropriate to the scientific program areas.

(c) Within areas of technological expertise, develops prototype systems applicable to specific projects.

(d) Performs scientific research and development for other Naval commands and, where specially qualified, for other agencies of the Department of Defense and, in defense related efforts, for other Government agencies.

(e) Upon request from appropriate naval commands, assumes responsibility as the Navy's principal R&D center in areas of unique professional competence.

(f) Provides to the Navy and its contractors standardized techniques and procedures for measurements and the accurate calibration of standard instruments in areas of special Navy needs.

(g) Furnishes scientific consultative services for the Navy and, where specially qualified, for other agencies of the Department of Defense and, in defense related efforts, for other Government agencies.

(h) Provides to the Navy determinations of performance characteristics of developmental and prototype devices through limited engineering test and evaluation services.

THE NAVY'S CORPORATE LABORATORY

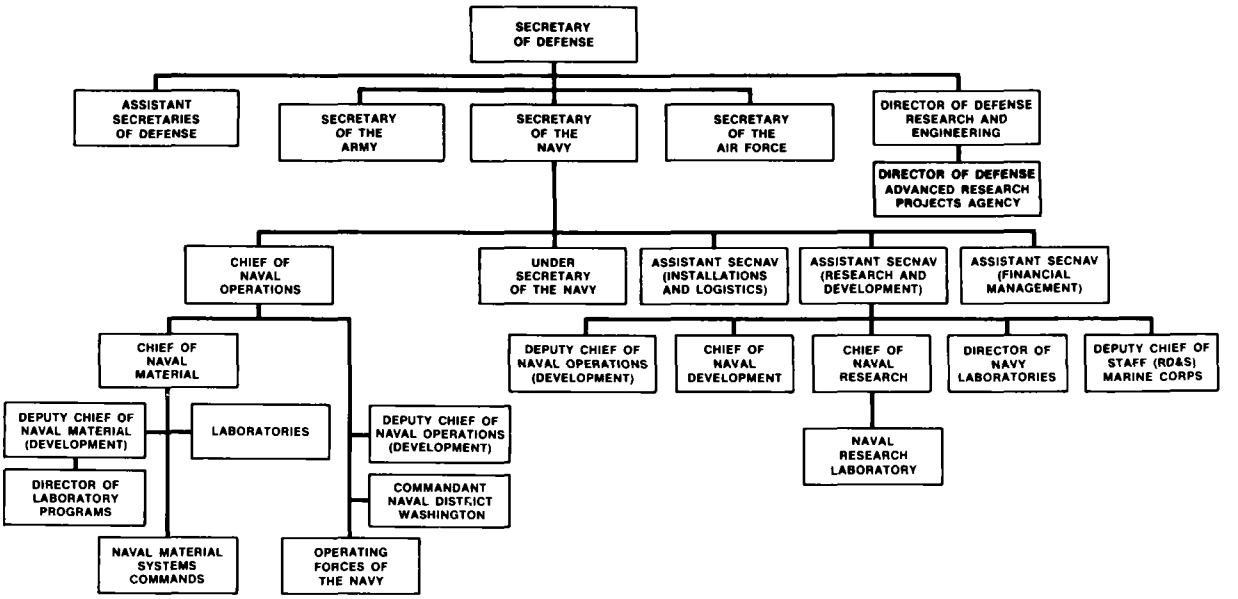
The Naval Research Laboratory is one of the principal in-house research and development institutions of the U.S. Government. It was established in 1923 to ensure that advancements in science and engineering could be readily applied to the Navy's needs. Directed always toward this end, the NRL research program has developed to its present status as a broadly based and coordinated effort in the physical, mathematical, and environmental sciences, in advanced engineering, and in naval analysis. The work of the Laboratory is conducted at the main establishment in the District of Columbia and at various field sites that provide unique environment and facilities not available at the main site.

Some principal elements of the research program include fundamental and applied work in radio wave propagation, oceanography, deep-sea instrumentation, submarine air purification, structural design theory, fracture mechanics, surface chemistry, optical physics, radar, underwater sound propagation, acoustic signal processing, sonar transducers, nuclear physics, radio astronomy, high-temperature lubricant, high-energy fuels, plasma physics, refractory metals, exotic materials for high-performance structures, x-ray astronomy, high-power lasers, solid-state physics, and stress-corrosion cracking of high-strength titanium steels and aluminum alloys.

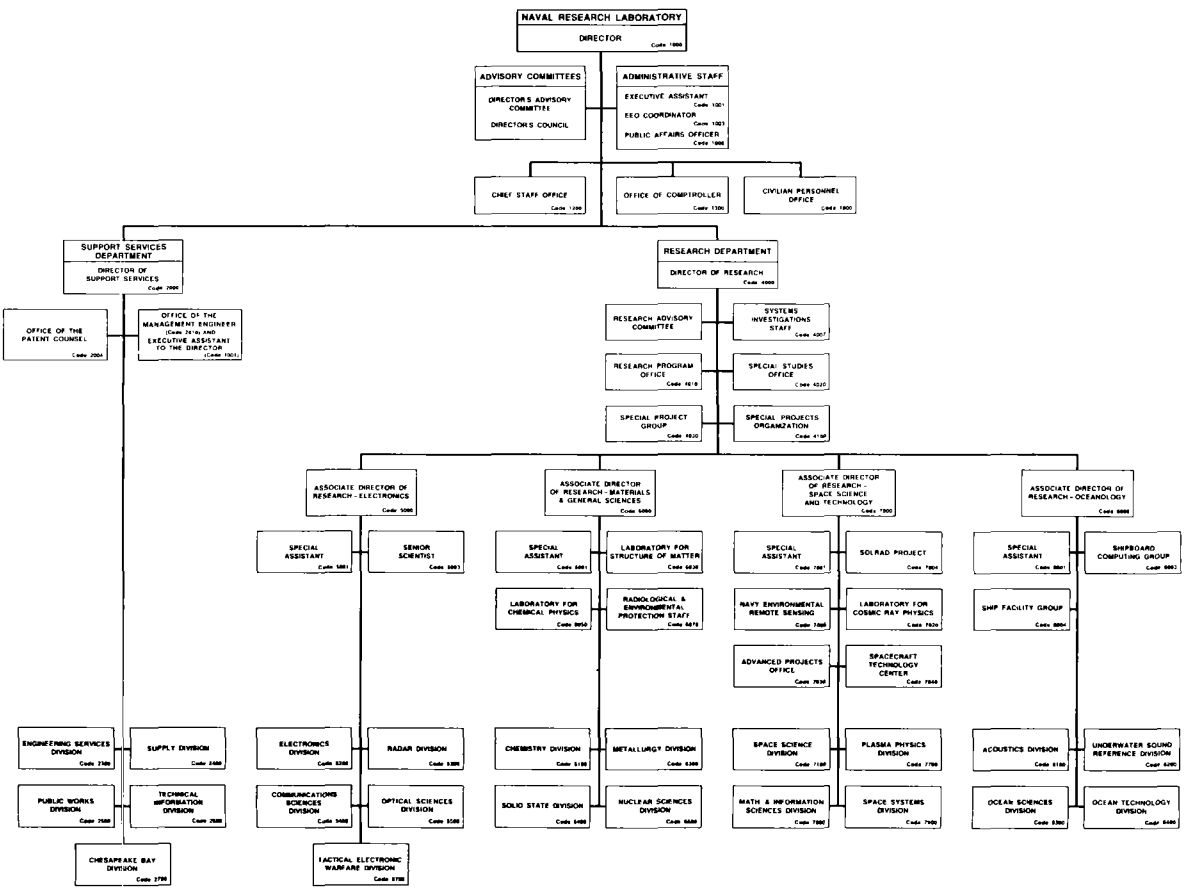
Over 1800 scientific and technical papers were produced in 1972 as a consequence of the research and development effort of the Laboratory staff. The figure includes 156 formal reports, 159 memorandum reports, 600 articles published in professional society journals, and over 862 papers presented at scientific and technical meetings in the United States and in foreign countries.

In addition, 45 U.S. patents were issued in 1972 on inventions made by present and former employees of the Naval Research Laboratory. This figure brings the grand total of NRL patents, through the calendar year 1972, to 2338.

In its investigations of broad scientific areas, in considering its findings for potential military applications, and in furnishing to the Naval Systems Commands and Secretariat expert consultative services relating to science and military systems, NRL functions as the corporate laboratory of the Navy. Thus it provides a central focus of research and development activity that supports the Navy. When NRL findings and capabilities have borne fruit in particular areas, the results are made known to and used by not only the Navy but also the Army, the Air Force, the Defense Advanced Research Projects Agency, the Atomic Energy Commission, and other agencies of the government.



Position of NRL in the Department of Defense structure



Organization chart of NRL

MILITARY AND CIVILIAN PERSONNEL

Military Personnel Attached to NRL as of Sept. 1, 1973

Officers	*Authorized*	*On Board*
Captain	3	4
Commander	8	12
Lieutenant Commander	10	8
Lieutenant	7	8
Lieutenant (Junior Grade)	1	5
Ensign	0	0
Warrant Officer	2	3
Total	31	40
Enlisted	84	65

Civilian Employees on Rolls as of June 30, 1973

10 USC 1581 (formerly Public Law 313)		24
Classification Act (GS)		2885
Scientific & Professional	1493	
Technical Supporting	615	
General Administrative & Clerical	777	
Wage Board		781
General Wage Service (WG)	629	
Apprentices, Planning, Estimating, etc. (WD)	72	
Printing & Lithographic Service (WI)	17	
Supervisory General Wage Service (WS)	57	
Inspection Service (WX)	3	
Leader (WL)	3	
Total		3690

Annual Civilian Turnover Rate (percent)

	1971	1972*	1973*
Research Department	4.5	7.8	7.5
Nonresearch Areas	11.3	9.6	12.0
Entire Laboratory	7.1	8.5	9.4

*Cost-of-living pension increases influenced the number of retirees

Highest Academic Degrees Held by Permanent Employees (as of June 30, 1973)

Bachelors	754
Masters	404
Doctorates	601

FISCAL INFORMATION

NRL FUNDING BY MAJOR SPONSOR
FISCAL YEARS 1973 AND 1974

Sponsor	FY 1973 (Act)		FY 1974 (Est)	
	Millions of Dollars	Percent	Millions of Dollars	Percent
R&D PROGRAM				
ONR	29.9	15.8	32.0	19.0
SHIP	28.8	15.3	18.0	10.7
ELEX	21.5	11.4	32.7	19.4
AIR	49.0	26.0	50.2	29.8
ORD	6.6	3.5	5.4	3.2
OTHER NAVY	10.3	5.4	7.9	4.9
TOTAL NAVY	146.1	77.4	146.2	87.0
OTHER DOD	27.4	14.5	10.5	6.2
NON-DOD	10.6	5.6	7.3	4.3
TOTAL R&D	184.1	97.5	164.0	97.5
NON R&D	3.0	1.7	3.0	1.8
CAPITAL IMPROVEMENT	1.6	0.8	1.2	1.7
TOTAL FUNDS	188.7	100.0	168.2	100.0

EXPENDITURES
(Excluding Plant Account Funds)
FY 1973-1974

Purpose	During FY 1973	During FY 1974
Materials, supplies and parts	$ 19,597,000	$ 22,200,000
Salaries and wages	69,290,000	72,000,000
Contractural services and other costs	98,213,000	72,800,000
TOTAL	$187,100,000	$167,000,000

CAPITAL PROPERTY

	As of June 1973
Class 1 (Land)	$ 434,686
Class 2 (Buildings and improvements)	78,612,005
Class 3 (Equipment)	18,271,724
Class 4 (Industrial production equipment)	16,652,802
TOTAL CAPITAL PROPERTY	$113,971,217

Office of the Director

The Director of the Naval Research Laboratory is a Navy Captain with appropriate educational background and experience. He is responsible for the overall operation and management of the Laboratory and its programs, and he executes the usual functions of command of a naval shore activity. The Directors of the Laboratory's two Departments, Research and Support Services, report to the Director. In carrying out the functions of his office, the Director is assisted by the Chief Staff Officer, the Comptroller, the Director of Civilian Personnel, an Executive Assistant, an EEO Coordinator, and a Public Affairs Officer.

Director, Naval Research Laboratory

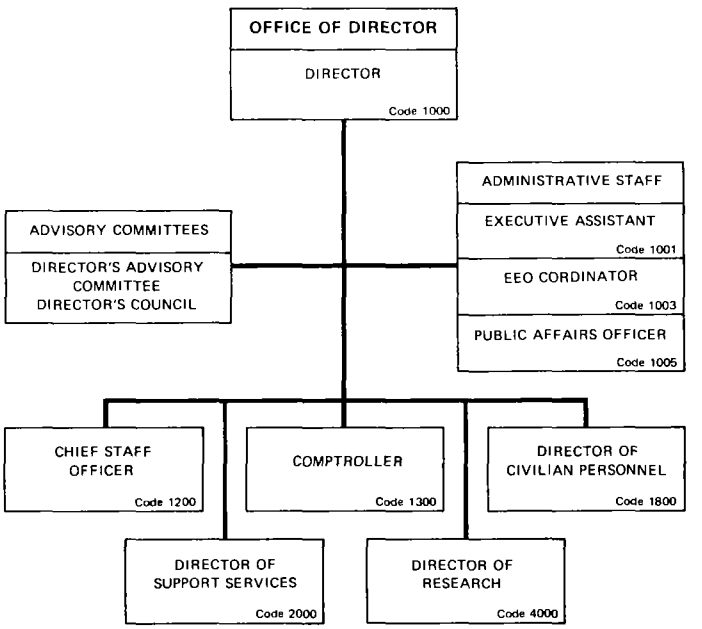
Captain John T. Geary, USN

CAPT GEARY [redacted]. He graduated from the U.S. Naval Academy in 1946, at which time he was commissioned Ensign, USN. He received an M.S. degree in engineering electronics from the U.S. Naval Postgraduate School in 1953 and an M.S. degree in business administration from the George Washington University in 1970. He graduated from ICAF (Industrial College of the Armed Forces) in 1970; he also attended numerous service schools, including, among others, the Defense Weapons Systems Management School and the Naval Radar Training School.

CAPT GEARY served in various shipboard assignments, including destroyers, cruisers, and amphibious ships, and as the operations officer for Commander, Destroyer Squadron 15, and was an instructor in electronics at the Naval Academy. Designated for Engineering Duty in 1956, he was assigned to Pearl Harbor Naval Shipyard and to Commander, Service Force U.S. Atlantic Fleet in electronics billets before coming to NRL in 1962 as Project Officer and BUSHIPS Liaison Officer. In 1964, he transferred to BUSHIPS, where he became the Head, Electronics Warfare Branch and managed many R&D Programs (approximately $50M annually) in electronics countermeasures systems and equipments. After 1 year at ICAF, he reported to NAVAIR as Director, Astronautics Division, providing SYSCOM management of Navy R&D efforts in Space, including Program 749, SOLRAD, and Timation, among others. CAPT GEARY served for 2 years in NAVELEX as ELEX 01, the Deputy Commander for Planning, Programming, and Resources Management, responsible for the overall management of NAVELEX's growing programs and budget, and as ELEX 05, Deputy Commander for Acquisition Engineering, as well as the Command's Inspector General.

He is a member of the Institute of Electrical and Electronics Engineers and the American Society of Naval Engineers.

OFFICE OF THE DIRECTOR



Key Personnel

Name	*Title*	*Code*
CAPT J.T. Geary, USN	Director	1000
Mr. S.L. Cohen	Executive Assistant	1001
Mr. W.H. Webster	EEO Coordinator	1003
Mr. J.E. Sullivan	Public Affairs Officer (Acting)	1005
CAPT J. Brozena, USN	Chief Staff Officer	1200
Mr. R.A. Showman	Comptroller (Acting)	1300
Mr. F.D. Wallace	Director of Civilian Personnel	1800
CAPT J.A. Bortner	Director of Support Services	2000
Dr. A. Berman	Director of Research	4000

EXECUTIVE ASSISTANT

Basic Responsibilities

The Executive Assistant provides the Director with executive level staff and managerial support in connection with the duties, interests, and activities of the Director.

Mr. S. L. Cohen

EQUAL EMPLOYMENT OPPORTUNITY COORDINATOR

Basic Responsibilities

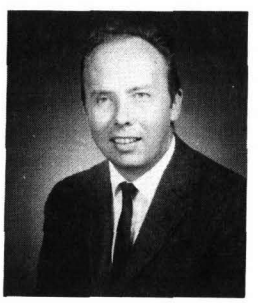
The Equal Employment Opportunity Coordinator serves as an advisor to the Director on EEO matters; conducts surveys and studies relating to NRL's Affirmative Action Plan and recommends methods for achieving its goals of a fully integrated work force; acts as ex officio member of the EEO Committee; and assists the EEO counselors in settling initial complaints of alleged discrimination.

Mr. W. H. Webster

PUBLIC AFFAIRS OFFICER

Basic Responsibilities

The Public Affairs Officer advises the Director and staff on all matters concerning public information, and he supervises the Laboratory's public affairs programs.

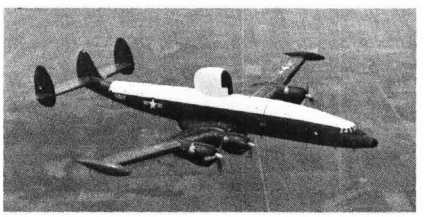


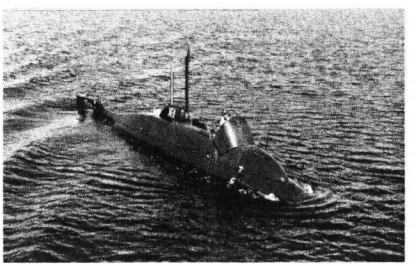
Mr. J. E. Sullivan
(Acting)

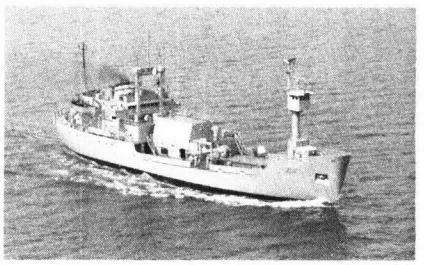
CAPT J. Brozena, USN

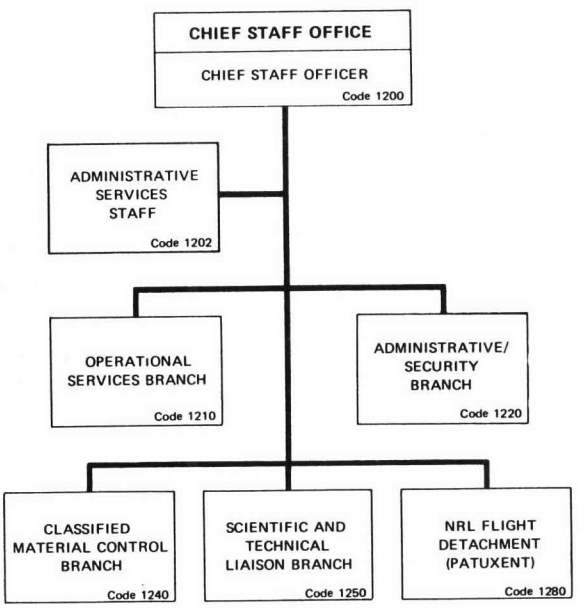
Chief Staff Office

- OPERATIONAL SERVICES
- SECURITY
- CLASSIFIED MATERIAL CONTROL
- SCIENTIFIC AND TECHNICAL LIAISON









Basic Responsibilities

The Chief Staff Officer provides a military staff to the Director, Naval Research Laboratory, for the purpose of assisting the Director in the military aspects of the management of the Laboratory. He conducts liaison with DOD and Navy Commands and activities and the operating forces of the Navy in support of NRL research and development operations and the coordination of the military application of the scientific work of the Laboratory. The Staff supports four multi-engine Laboratory aircraft and obtains and coordinates such additional air, surface, and subsurface services as are required. The Military Staff is also responsible for personnel and plant security, communications, and control of classified material.

Key Personnel

Name	*Title*
CAPT J. Brozena, USN	Chief Staff Officer
Mr. J.R. Gallagher	Administrative Services Officer
LT T.R. Cocozza, USN	Communications/Military Personnel Officer
CDR D.F. Moxley, USN	Operational Services Officer
CDR L.R. Marshall	Administrative/Security Officer
Mr. W.C. Bryan	Head, Special Activities Office
Mr. J.M. Manser	Head, Security Section
Mr. J.J. Bagley	Classified Material Control Officer
CDR W. Glickman, USN	Scientific and Technical Liaison Officer
CDR G. Janulis, USN	OIC, NRL Flight Detachment (Patuxent)

Personnel Complement

On Board: 160
(86 Civilian, 70 Military)

Office of the Comptroller

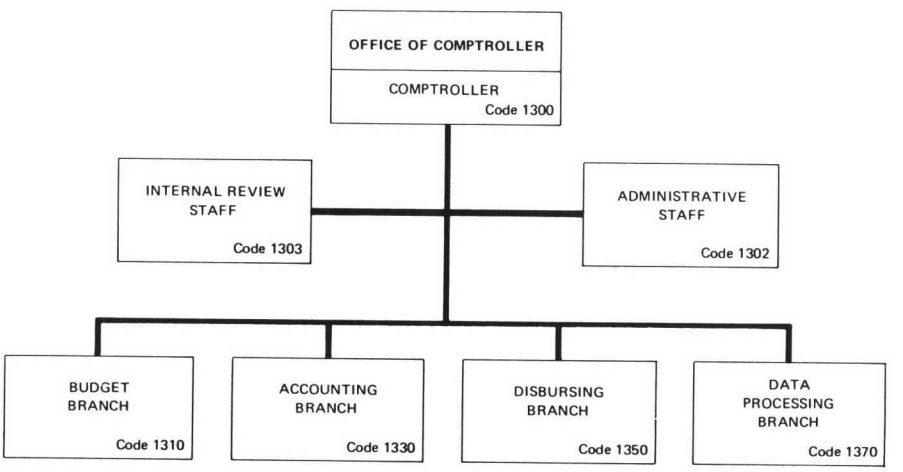
Mr. R. A. Showman

INTERNAL REVIEW

BUDGET OFFICE

COMPUTER

- BUDGET
- ACCOUNTING
- DISBURSING
- DATA PROCESSING



Basic Responsibilities

The Comptroller is the financial adviser to the Director and other officials of the Laboratory. He administers the financial program of the Laboratory.

Key Personnel

Name	*Title*
Mr. R.A. Showman	Comptroller (Acting)
Mr. D.M. Johnson	Budget Officer
Mr. D.K. Jones	Accounting Officer
WO2 Lydia C. Gelardi, USN	Disbursing Officer
Mr. R.L. Guest	Data Processing Officer
Mr. R.A. Showman	Head, Internal Review Staff

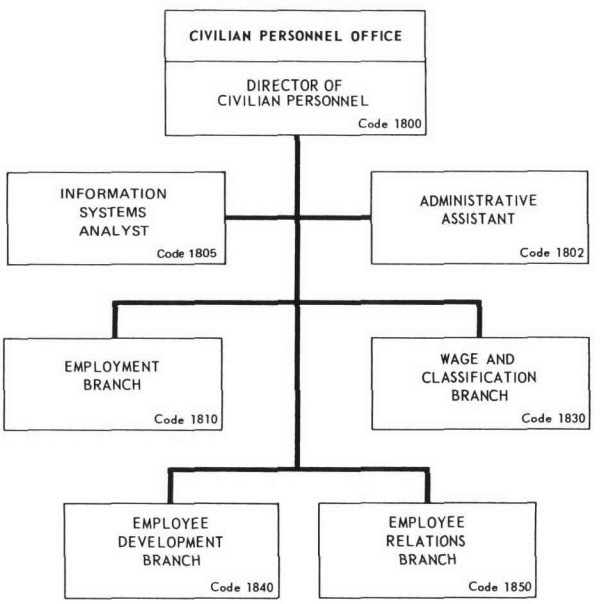
Personnel Complement

On Board: 101

Mr. F. D. Wallace

Civilian Personnel Office

- EMPLOYMENT
- WAGE AND CLASSIFICATION
- EMPLOYEE DEVELOPMENT
- EMPLOYEE RELATIONS



Basic Responsibilities

The Civilian Personnel Office administers the Laboratory's personnel program, which includes selection, development, promotion, utilization, appropriate recognition, and employee counseling and services for all civilian personnel.

Key Personnel

Name	*Title*
Mr. F.D. Wallace	Director of Civilian Personnel
Mr. D.E. Chaquette	Information Systems Analyst
Mr. D. Blome	Head, Employment Branch
Miss D.A. Myers	Head, Wage and Classification Branch
Mr. J.E. Goss	Head, Employee Development Branch
Mr. H.H. Kay	Head, Employee Relations Branch

Personnel Complement

On Board: 44

The Research Department

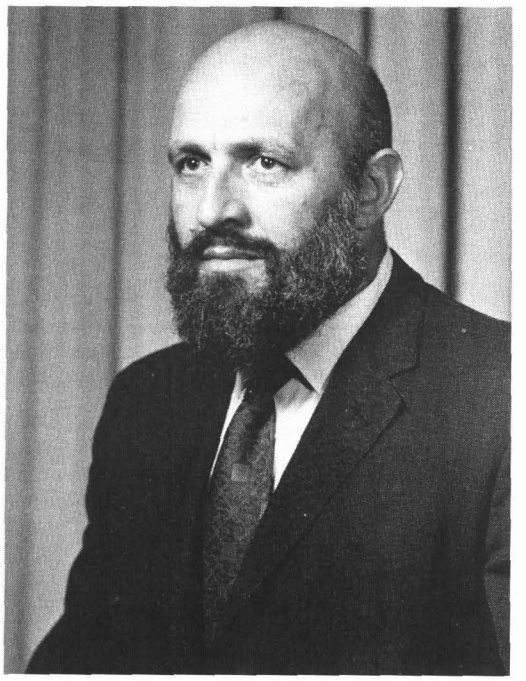
The Research Department is headed by a civilian Director of Research who reports to the Director of NRL. The Department is comprised of four organizational areas of research — Electronics, Materials and General Sciences, Space Science and Technology, and Oceanology — each of which is headed by an Associate Director of Research. Encompassed by these four broad areas of research, which correspond to the principal areas of the Navy's interest in the physical and engineering sciences, are 17 divisions and additional special groups. Each division is headed by a civilian scientist and is comprised of an average of about 110 scientific, technical, and administrative personnel. The special groups average about 13 persons each. Three of the special groups (Laboratory for the Structure of Matter, Laboratory for Chemical Physics, and Laboratory for Cosmic Ray Physics) are headed by Chief Scientists who occupy corresponding "Chairs of Science."

The Director of Research is the Chief Scientist for the Laboratory; in this capacity he is responsible for:

- the conduct and effectiveness of the research program with direct authority and accountability for the technical work.
- long range and broad overall planning and programming.
- evaluating and accepting, modifying, or rejecting R&D proposals from NRL's scientific divisions; and for evaluating and recommending to the Director of NRL the acceptance or rejection of new problems from other activities.
- Research Department administration and the budgeting of funds.
- hiring, promoting, and effecting other personnel actions for Research Department personnel.

The Director of Research keeps the Director of Support Services informed at all times of the service needs of the scientific divisions and of any obstacles which may be impeding technical work of the Laboratory; he advises the Comptroller relative to requirements and control of funds; he also is encouraged to advise the Chief of Naval Research directly of the progress of the research program and of the overall climate for research at the Laboratory.

Director of Research



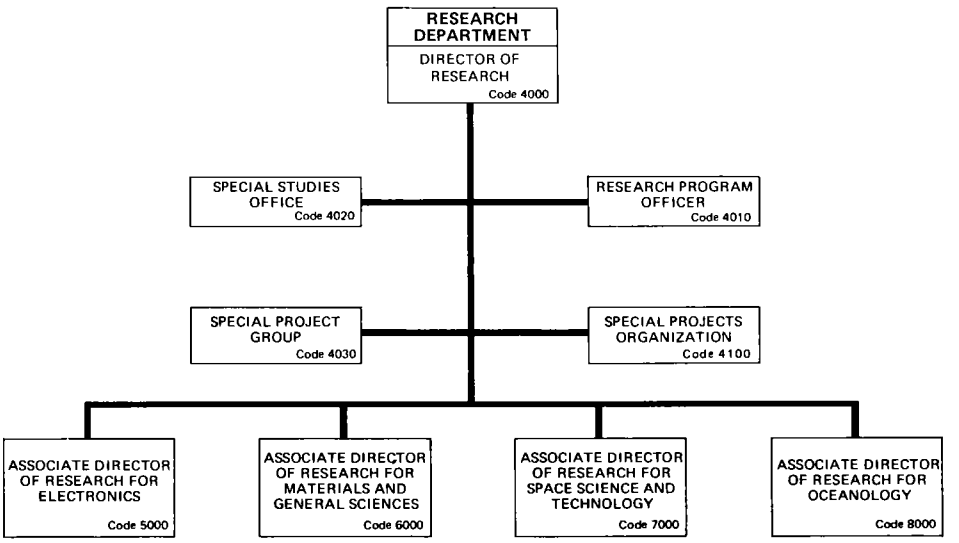
Dr. Alan Berman

Dr. Berman [redacted]. He received the A.B. degree in physics from Columbia College in 1947 and the Ph.D. degree in physics from Columbia University in 1952.

From 1952 to 1955 he was a research scientist at the Hudson Laboratories of Columbia University. He became Assistant Director of Hudson Laboratories in 1955, Associate Director in 1957, and Director in 1963. On May 29, 1967, Dr. Berman became Director of Research for the Naval Research Laboratory.

Dr. Berman's research specialties include the areas of underwater acoustics, oceanography, and signal processing. He has published numerous papers on these and related subjects. At present he is a member or chairman of a wide variety of Navy and oceanographic advisory groups. He also provides advisory services for a number of Department of Defense and other Government agencies.

Dr. Berman has on three occasions been visiting scientist to the Admiralty Research Laboratory, Teddington, England (1955, 1957, 1960), and once at the SACLANT ASW Research Center, La Spezia, Italy (1960).



Key Personnel

Name	*Title*	*Code*
Dr. A. Berman	Director of Research	4000
Mr. H.P. Gates	Consultant	4003
Mr. E.L. Brancato	Consultant	4004
Mr. J. Brown	Head, Systems Investigation Staff	4007
Mr. A. Hollings	Head, Research Program Office	4010
Mr. C.L. Tipton	Head, Special Studies Office	4020
CAPT T.H. Sherman, USN	Head, Special Projects Group	4030
Mr. R.E. Ellis	Head, Special Projects Organization	4100
Dr. J.L. Allen	Associate Director of Research for Electronics	5000
Dr. J.H. Schulman	Associate Director of Research for Materials and General Sciences	6000
Dr. H. Rabin	Associate Director of Research for Space Science and Technology	7000
Dr. R.R. Goodman	Associate Director of Research for Oceanology	8000

RESEARCH PROGRAM OFFICE

Basic Responsibilities

The Research Program Office serves as staff to the research directorate of the Laboratory. It provides an orderly plan for coordinating NRL research programs with those of ONR and other sponsors or potential sponsors throughout the Departments of the Navy, the Army, and the Air Force, the Defense Advanced Research Projects Agency, and other agencies of the government. It also serves as a focal point for program information for project managers and other key personnel of sponsoring activities on work in progress or in various stages of planning. The Research Program Office maintains a management information center which serves as a working tool for the Laboratory directorate, and it maintains appropriate records of the Laboratory's research programs.

Key Personnel

Name	*Title*
Mr. A.J. Hollings	Head, Research Program Office
Mr. R.E. Seebold	Deputy Head, Research Program Office
Mr. R.C. Spragg	Head, Management Information Center Section
Mr. R.E. Seebold	Head, Short-Range Program Planning and Appraisal Section
Mr. N. Moglen	Staff Assistant — ADP

Mr. A. J. Hollings

Personnel Complement

On Board: 12

SPECIAL STUDIES OFFICE

Basic Responsibilities

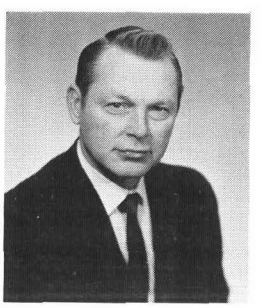
The Special Studies Office provides analytical staff support to the Director of Research in the fields of strategic, tactical, and special warfare as well as data management science. Programs of operations research, systems analysis, and equipment developments are undertaken to provide a substantive basis for (a) the orientation and conduct of naval research and development, and (b) the general delineation of advanced weapon systems and force structure requirements for the mid- to long-range time period.

Office Activities

Operations Analysis
Systems Analysis
Systems Applications
Data Systems

Key Personnel

Name	*Title*
Mr. C.L. Tipton	Head, Special Studies Office
Dr. H.S. Liers	Technical Consultant
Mrs. E.E. Wald	Head, Data Systems Section
Mr. C.L. Tipton	Head, Operations Analysis Section (Acting)
Mr. H. Ascher	Head, Systems Analysis Section
Dr. G. Abraham	Head, Systems Applications Section



Mr. C. L. Tipton

Personnel Complement

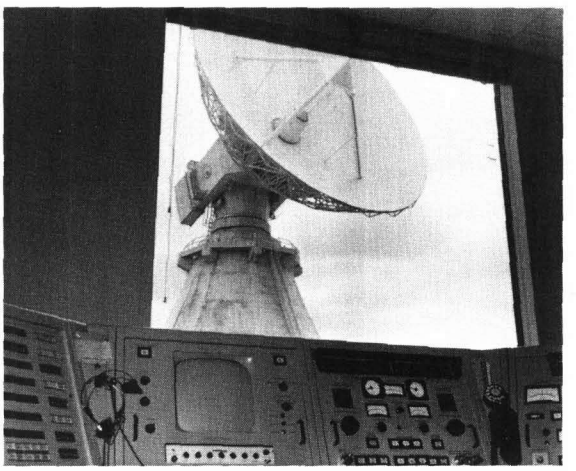
On Board: 16

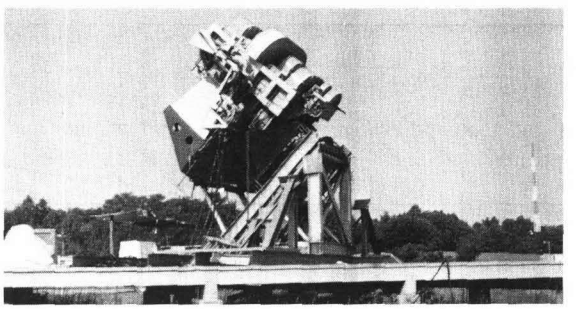
Total Estimated R&D Funding

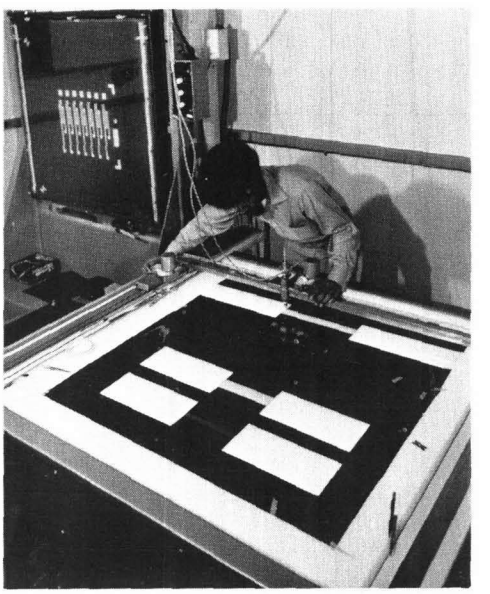
Fiscal Year 1974: $900,000

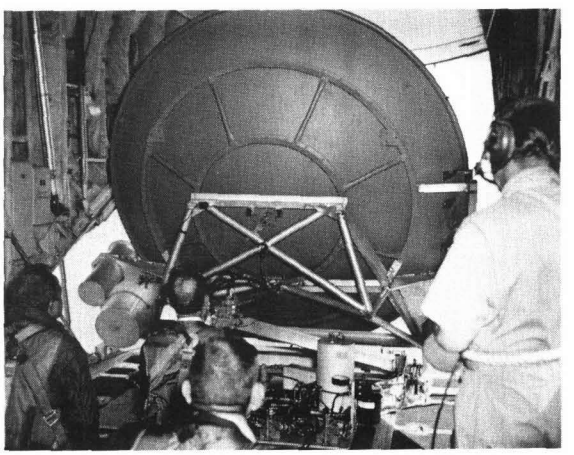
Electronics Area

The Navy's operational effectiveness depends greatly on its ability to make optimum use of the electromagnetic spectrum ranging from the very low to the extremely high frequencies. Accordingly, most of this Area's work is directed toward extending both the knowledge and the technological applications of the electromagnetic spectrum. The effort includes investigations of electronic devices, the phenomenology and advanced instrumentation associated with radio communications, radar, and related sensors, and digital computation and information-processing. NRL also serves as the lead laboratory for the Navy's exploratory development program in electronic warfare.









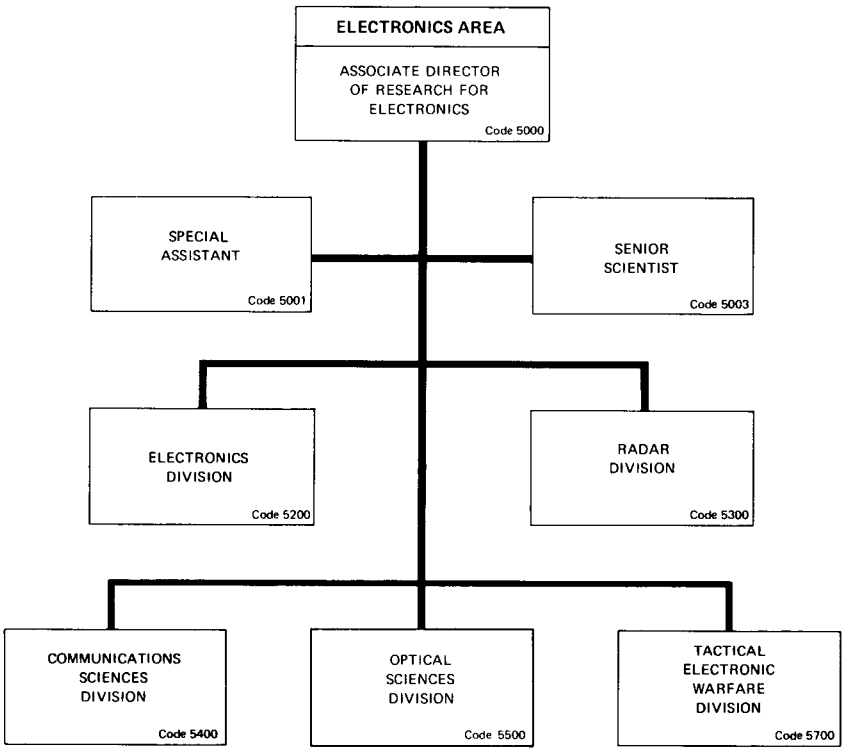
Associate Director of Research for Electronics

Dr. John L. Allen

Dr. Allen [redacted] He graduated from Pennsylvania State University in 1958 with a B.S. degree in engineering science and from Massachusetts Institute of Technology with an M.S. in electrical engineering in 1962 and a Ph.D. in communication biophysics in 1968.

Dr. Allen joined the Research Department of NRL as the Associate Director of Research for Electronics on March 1, 1971 where he has responsibility for work in radar, communications, electronic warfare and electronic devices. He served in the USAF and worked at what is now HRB Singer and at M.I.T. Lincoln Laboratory. At Lincoln he organized and was the first leader of the Array Radar Group. He was later promoted to Associate Head of the Radar Measurements Division.

Dr. Allen is a fellow of the Institute of Electrical and Electronic Engineers and a member of the Tau Beta Pi Engineering Honor Society. He has served on several studies and committees for professional societies and for the Department of Defense.


ELECTRONICS AREA
ASSOCIATE DIRECTOR OF RESEARCH FOR ELECTRONICS
Code 5000
SPECIAL ASSISTANT
Code 5001
SENIOR SCIENTIST
Code 5003
ELECTRONICS DIVISION
Code 5200
RADAR DIVISION
Code 5300
COMMUNICATIONS SCIENCES DIVISION
Code 5400
OPTICAL SCIENCES DIVISION
Code 5500
TACTICAL ELECTRONIC WARFARE DIVISION
Code 5700

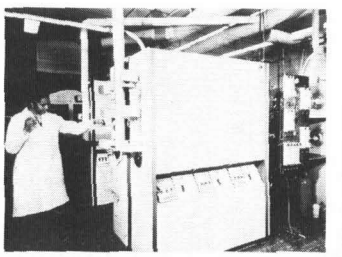
Key Personnel

Name	*Title*
Dr. J.L. Allen	Associate Director of Research for Electronics
Mr. P.L. Lester	Special Assistant
Dr. L.B. Wetzel	Senior Scientist
Mr. L.A. Gebhard	Consultant
Mr. H. Bress	Consultant
Mr. A. Brodzinsky	Superintendent, Electronics Division
Mr. J.H. Dunn	Superintendent, Radar Division
Dr. B. Wald	Superintendent, Communications Sciences Division
Dr. W.R. Sooy	Superintendent, Optical Sciences Division
Mr. L.A. Cosby	Superintendent, Tactical Electronic Warfare Division

Electronics Division

Mr A Brodzinsky

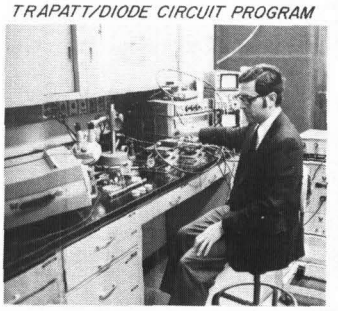
- RESEACH DEVICES FACILITY
- SOLID STATE TECHNOLOGY
- ELECTRON PHYSICS
- MICROWAVE TECHNIQUES



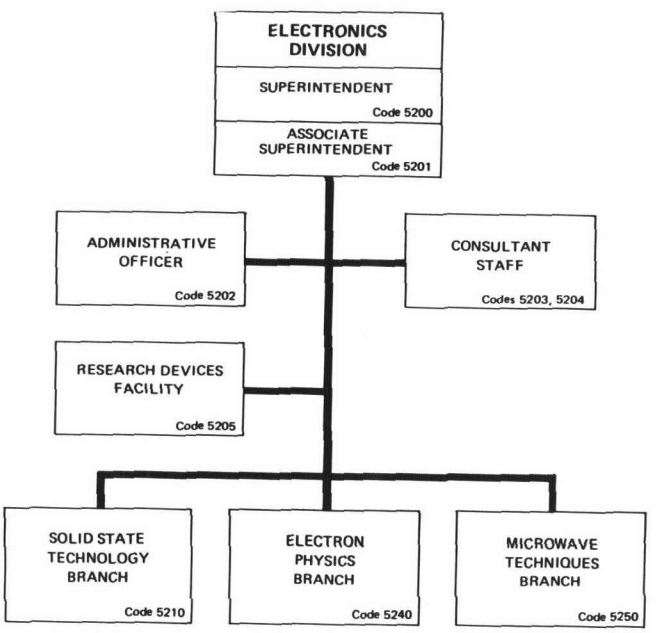
FABRICATION OF SOLID STATE DEVICES

SURFACE WAVE TRANSDUCER RESEARCH

TRAPATT/DIODE CIRCUIT PROGRAM



S-BAND TWT HELIX PREPARATION



Basic Responsibilities

The Electronics Division carries out programs of basic and applied research and development in the fields of electronic properties of solid materials, microwave antennas and components, microelectronic technology and high power microwave electron devices for use in equipments and systems of interest to the Navy and DOD.

Branches

Solid State Technology

- Microwave device theory, fabrication, and reliability
- Ion implantation technology
- High and low power devices for energy conversion
- Functional devices (thin film, MIS, CCD)
- MIS failure physics; radiation hardening

Electron Physics

- Microwave tubes
- Surface physics research
- Microwave components
- Electron beam semiconductor devices

Microwave Techniques

- Millimeter wave device research
- Adaptive array studies
- Advanced microwave antenna research
- Microwave integrated circuits
- Microwave ferrimagnetic components
- Surface wave acoustics

Research Devices Facility

- Fabricates experimental components in the following technologies:
  - Microelectronic devices
  - Optical components and coatings
  - Glassblowing
  - Electron tube assembly

Key Personnel

Name	*Title*
Mr. A. Brodzinsky	Superintendent
Dr. R.W. Wright	Associate Superintendent
Dr. D.O. Patterson	Head, Research Devices Facility
Dr. L. Young	Consultant
Dr. J.E. Davey	Head, Solid State Technology Branch
Dr. S.T. Smith	Head, Electron Physics Branch
Dr. L.R. Whicker	Head, Microwave Techniques Branch

Personnel Complement

On Board: 90

Total Estimated R&D Funding

Fiscal Year 1974: $4,838,000

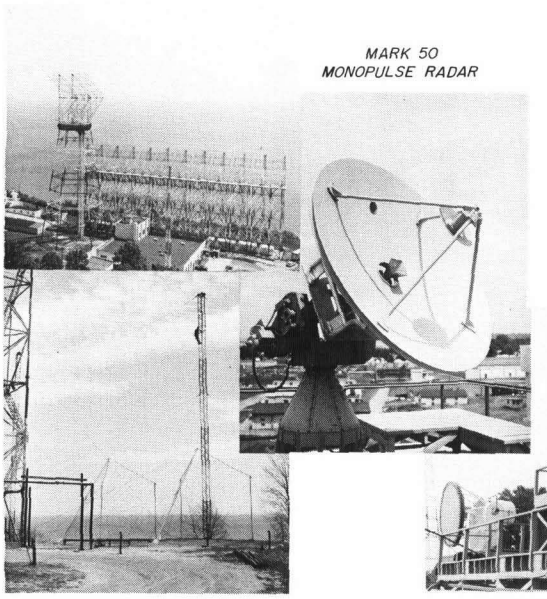
Mr. J. H. Dunn

Radar Division

- RADAR TECHNIQUES
- SEARCH RADAR
- TARGET CHARACTERISTICS
- AIRBORNE RADAR

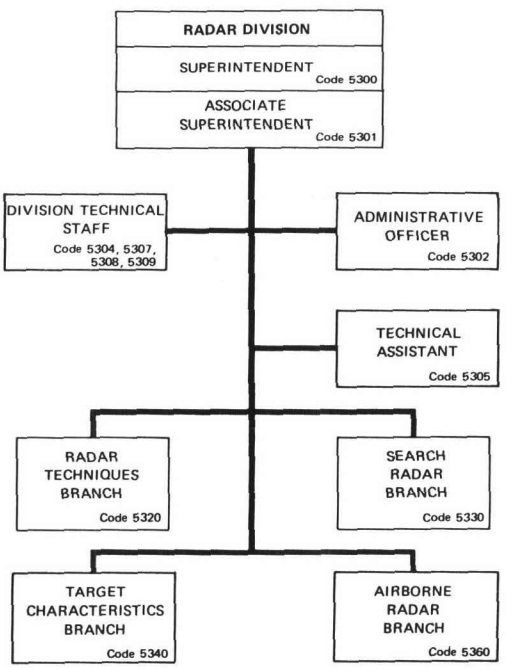
HF ADVANCED RESEARCH RADAR

MARK 50 MONOPULSE RADAR



HF SURFACE WAVE ANTENNA

MULTI-BAND EXPERIMENTAL RADAR COMPLEX



Basic Responsibilities

The Radar Division conducts research on basic physical phenomena of importance to radar and related sensors, investigates new engineering techniques applicable to radar, demonstrates the feasibility of new radar concepts and systems, performs related systems analysis and evaluation of radar, and provides special consultative services. The emphasis is on new and advanced concepts and technology in radar and related sensors which are applicable to enhancing the Navy's ability to fulfill its mission.

Staff Activity

Division Technical Staff

Radar Analysis
Mechanical Design
Systems Research
Systems Analysis

Branches

Radar Techniques

- High-frequency radar
- Signal processing

Search Radar

- Phased array techniques
- Precision tracking radar techniques
- Radar evaluation
- Range instrumentation
- Signal processing

Target Characteristics

- Target signature analysis
- ECCM
- System concepts for shipboard radar

Airborne Radar

- Airborne radar
- Airborne early warning radar
- Moving target indication

Key Personnel

Name	*Title*
Mr. J.H. Dunn	Superintendent (Acting)
Mr. J.H. Dunn	Associate Superintendent
Mr. W.N. Shaddix	Technical Assistant
Mr. J.M. Headrick	Head, Radar Techniques Branch
Dr. R.J. Adams	Head, Search Radar Branch
Mr. I.D. Olin	Head, Target Characteristics Branch
Mr. D.L. Ringwalt	Head, Airborne Radar Branch

Personnel Complement

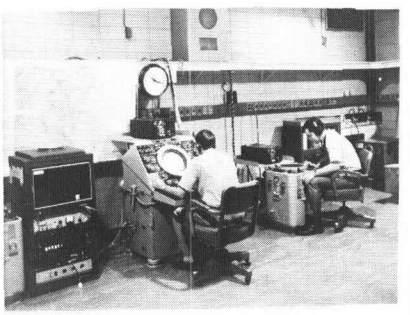
On Board: 140

Total Estimated R&D Funding

Fiscal Year 1974: $10,400,000

Communications Sciences Division

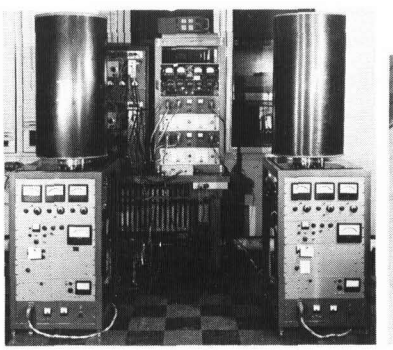
Dr. B. Wald



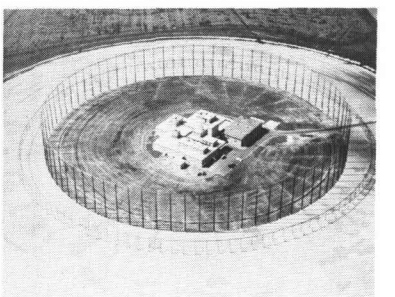
IFF RESEARCH FACILITY

MICROWAVE SPACE RESEARCH FACILITY

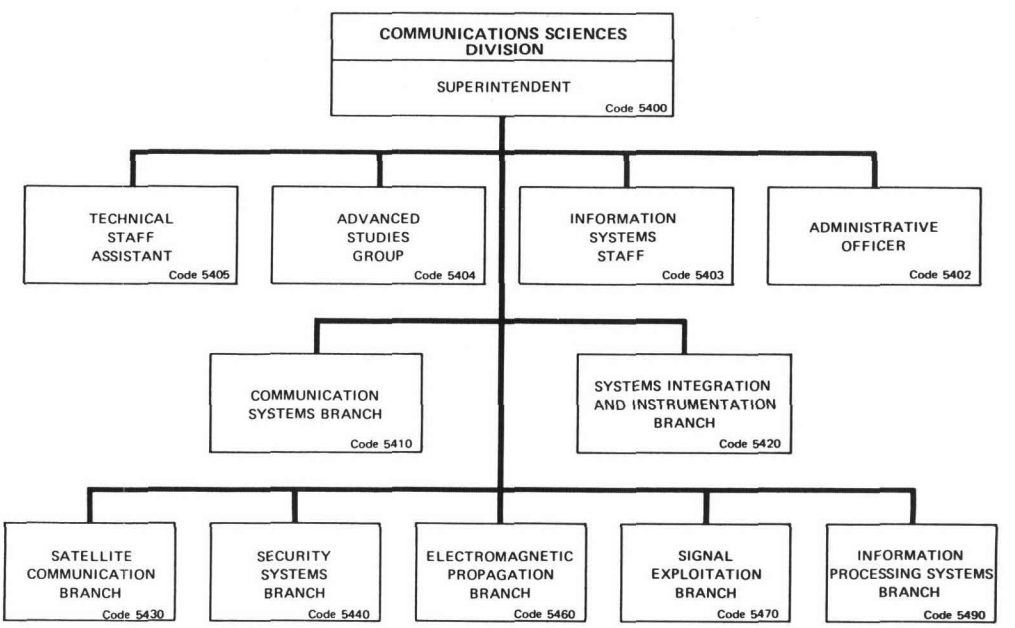
- COMMUNICATION SYSTEMS
- SYSTEMS INTEGRATION AND INSTRUMENTATION
- SATELLITE COMMUNICATION
- SECURITY SYSTEMS
- ELECTROMAGNETIC PROPAGATION
- SIGNAL EXPLOITATION
- INFORMATION PROCESSING SYSTEMS



HYDROGEN MASER TIME STANDARDS



HF ANTENNA



Basic Responsibilities

The Communications Sciences Division conducts research and development in the systems, sensors, techniques, instrumentation and phenomenology of communications, signal exploitation, and information processing. The major emphasis is placed on those new concepts and techniques that will specifically enhance the Navy's capabilities in the collection, processing, transmission, and distribution of information.

Staff Activity

Information Systems Staff
- Systems agriculture
- Information management
- Computer science

Branches

Communication Systems
- Submarine communication systems
- Antenna and rf distribution systems
- Underwater reception

Systems Integration and Instrumentation
- Precise frequency and time
- Secure communication systems
- Source data and channel encoding

Signal Exploitation
- Radio frequency intercept and signal processing
- Direction finding and position location
- Signal storage and display
- Data storage
- Data processing
- Recording and display

Satellite Communication
- Satellite communication systems
- Modem and processor studies
- Low probability of intercept technology

Electromagnetic Propagation
- ULF and LF propagation research

Security Systems
- Secure identification
- Integrated communication, navigation, and identification systems
- Anti-jam technology

Information Processing Systems
- AN/UYK-17 signal processing element
- Radar and acoustic applications
- Emulation Studies

Key Personnel

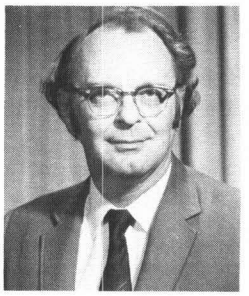
Name	*Title*
Dr. B. Wald	Superintendent
Mr. M.L. Musselman	Technical Staff Assistant
Dr. B. Wald	Head, Information Systems Staff (Acting)
Dr. W.S. Ament	Advanced Studies Group
Mr. H.D. Cubbage	Head, Communication Systems Branch
Mr. D.I. Himes	Head, Systems Integration and Instrumentation Branch
Mr. J.P. Leiphart	Head, Satellite Communication Branch
Mr. C.V. Parker	Head, Security Systems Branch
Mr. W.E. Garner	Head, Electromagnetic Propagation Branch
Mr. R.D. Misner	Head, Signal Exploitation Branch
Mr. Y.S. Wu	Head, Information Processing Systems Branch

Personnel Complement

On Board: 180

Total Estimated R&D Funding

Fiscal Year 1974: $17,000,000

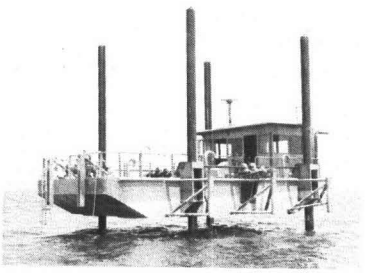


Optical Sciences Division

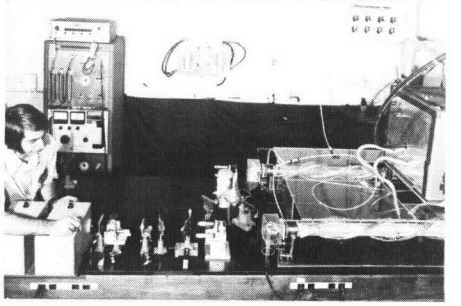
Dr. W. R. Sooy

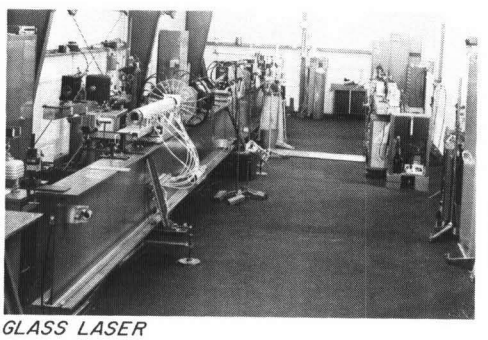
- OPTICAL PHYSICS
- INTERACTION PHYSICS
- APPLIED OPTICS
- LASER PHYSICS
- OPTICAL WARFARE
- OPTICAL RADIATION

JACK-UP BARGE AT CBD

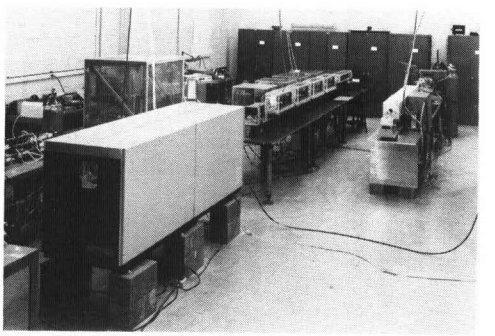


FOUR-WAVE INFRARED MIXING EXPERIMENT

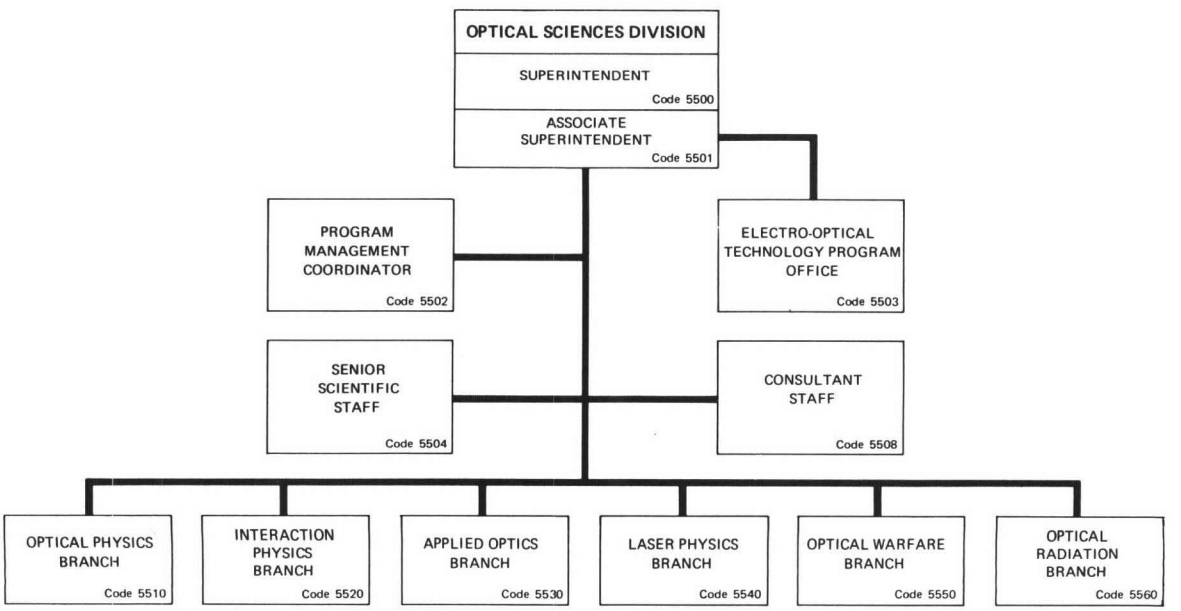




GLASS LASER



CO_2 PULSE LASER



Basic Responsibilities

The Optical Sciences Division carries out a variety of research, development, and application-oriented activities in the generation, propagation, detection, and use of radiation in the wavelength region between near ultraviolet and far infrared. The research, both theoretical and experimental, is concerned with discovering and understanding the basic physical principles and mechanisms involved in optical devices and phenomena. The development effort is aimed at extending this understanding in the direction of device engineering and advanced operational techniques. The applications activities include systems analysis and prototype system development and exploitation of research and development for the solution of optically related military problems. In addition to its internal program activities, the Division serves the Laboratory specifically and the Navy generally as a consulting body of experts in optical sciences and focuses some of this effort through the Electro-Optical Technology Program Office. The work in the Division includes studies in quantum optics, laser physics, laser-matter interactions, atmospheric propagation, optical technology, holography, optical warfare, optical radar, and optical systems. A variety of field measurement programs on optical problems of specific interest are also conducted.

Staff Activities

Electro-Optical Technology Program Office
- Electro-optical program assessment and advisory support

Senior Scientific and Consultant Staff
- Special systems analysis
- Technical study groups
- Technical contract monitoring

Branches

Optical Physics
- Nonlinear optical phenomena
- Picosecond light pulses
- Light scattering in solids
- Nonlinear effects in materials
- Optical waveguides
- Liquid crystals

Interaction Physics
- Laser controlled fusion
- Laser x-ray generation
- X-ray lasers
- Laser-matter interactions
- High-power glass laser development

Optical Warfare
- Optical and IR countermeasures
- Optical intelligence
- Optical and electro-optical techniques

Optical Radiation
- Laser system engineering
- Electro-optic applications
- Optical instrumentation
- Interferometry
- Systems operation
- Atmospheric optics
- Propagation studies

Laser Physics
- Molecular laser physics
- Chemical laser physics
- Electrically driven lasers

Applied Optics
- Optical intelligence
- Optical characteristics of military targets
- Optical technology

Key Personnel

Name	*Title*
Dr. W.R. Sooy	Superintendent
Dr. L.F. Drummeter, Jr.	Associate Superintendent
Dr. W.R. Sooy	Head, Electro-Optical Technology Program Office
Dr. J.M. MacCallum, Jr.	Deputy Head, Electro-Optical Technology Program Office
Dr. H.W. Gandy	Special Assistant to MAT-03
LCDR L. Brown	Senior Technical Staff
Dr. R.C. Elton	Senior Technical Staff
Dr. F. Milton	Senior Technical Staff
Dr. H. Shenker	Senior Technical Staff
Mr. L.E. Triggs	Senior Technical Staff
Dr. W.L. Faust	Head, Optical Physics Branch
Dr. R.A. Andrews	Head, Interaction Physics Branch
Dr. R.A. Patten	Head, Applied Optics Branch
Dr. R. Airey	Head, Laser Physics Branch
Mr. J.R. Anderson	Head, Optical Warfare Branch
Dr. P.M. Livingston	Head, Optical Radiation Branch

Personnel Complement

On Board: 125

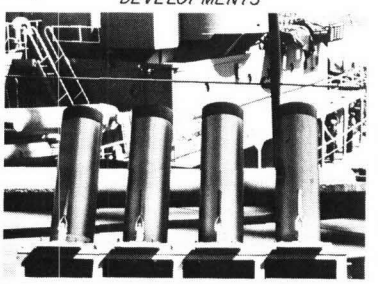
Total Estimated R&D Funding

Fiscal Year 1974: $10,400,000

Tactical Electronic Warfare Division

Mr. L. A. Cosby

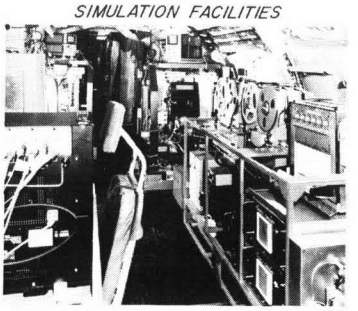
DECOYS AND EXPENDABLES DEVELOPMENTS

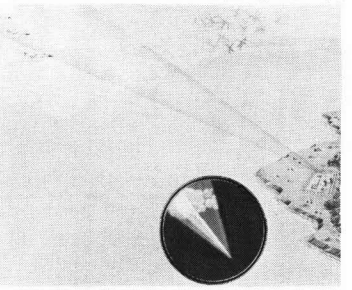


MATHEMATICAL MODELLING AND EFFECTIVENESS EVALUATION

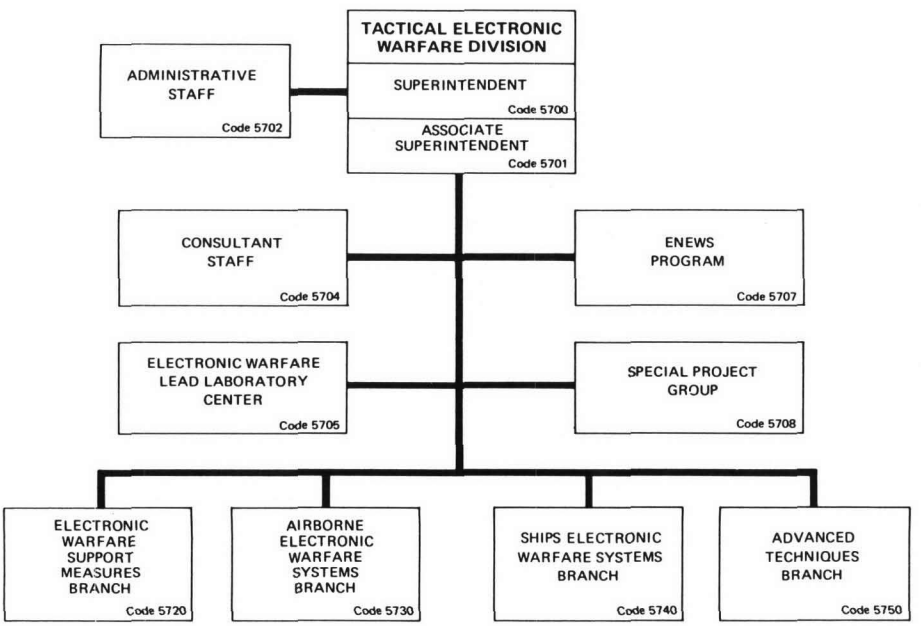
- LEAD LABORATORY CENTER
- EFFECTIVENESS OF NAVAL EW SYSTEM (ENEWS)
- SPECIAL PROJECT
- ELECTRONIC WARFARE SUPPORT MEASURES
- AIRBORNE ELECTRONIC WARFARE SYSTEMS
- SHIPS ELECTRONIC WARFARE SYSTEMS
- ADVANCED TECHNIQUES

AIRBORNE LABORATORY SIMULATION FACILITIES





DECEPTIVE ELECTRONIC COUNTERMEASURES



Basic Responsibilities

The Tactical Electronic Warfare Division is responsible for research and development in support of the Navy's tactical electronic warfare requirements and missions. These include electronic warfare support measures, electronic countermeasures, supporting counter-countermeasures, as well as study, analyses, and simulations for the determination and improvement of the effectiveness of these systems.

Staff Activities

Lead Laboratory Coordinating Staff
- Navy in-house exploratory development
- Program reference center
- Advanced Technical Objectives Working Group
- Analyses and liaison

ENEWS
- EW effectiveness
- Simulation analysis and measurement

Special Project Group
- Vulnerability analysis
- Special countermeasures

Branches

Airborne Electronic Warfare Systems
- Air systems development
- Penetration aids
- Expendable devices

Ships Electronic Warfare Systems
- Ships systems development
- Jamming technology
- Deception techniques
- EW antennas
- Simulators

Electronic Warfare Support Measures
- Intercept systems
- Direction finding
- Systems integration
- Command and control interfaces

Advanced Techniques
- Analysis and simulation
- Expendables technology
- New EW techniques
- Experimental systems

Key Personnel

Name	*Title*
Mr. L.A. Cosby	Superintendent
Dr. G.P. Ohman	Associate Superintendent (Acting)
Mr. L.A. Cosby	Lead Laboratory Coordinator and Head, Electronic Warfare Lead Laboratory Center (Acting)
Mr. D.F. Grady	Manager, ENEWS Program
Mr. L.A. Cosby	Program Manager, Special Project
Mr. N.J. Lesko	Deputy Program Manager, Special Project (Acting)
Mr. M.J. Sheets	Head, Electronic Warfare Support Measures Branch
Mr. R.L. Brandenburg	Head, Airborne Electronic Warfare Systems Branch
Mr. A.J. Jesswein	Head, Ships Electronic Warfare Systems Branch
Dr. G.P. Ohman	Head, Advanced Techniques Branch (Acting)

Personnel Complement

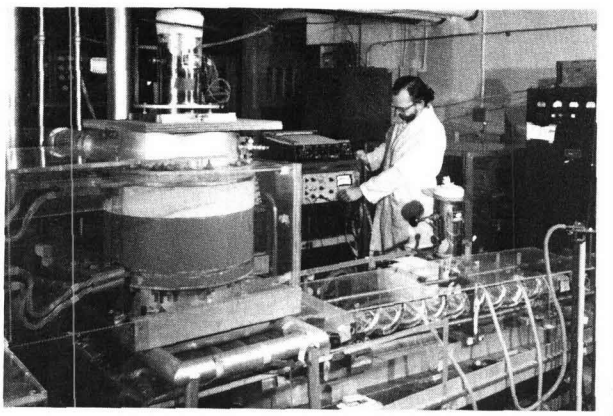
On Board: 157

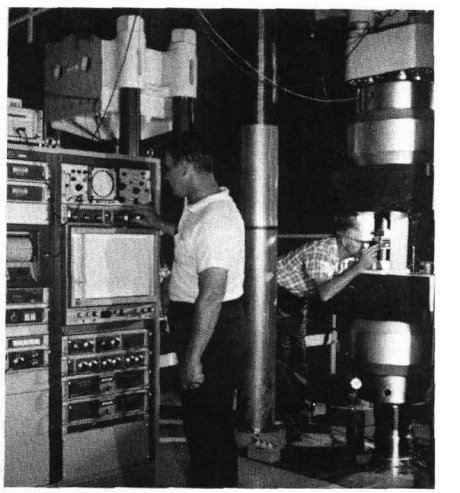
Total Estimated R&D Funding

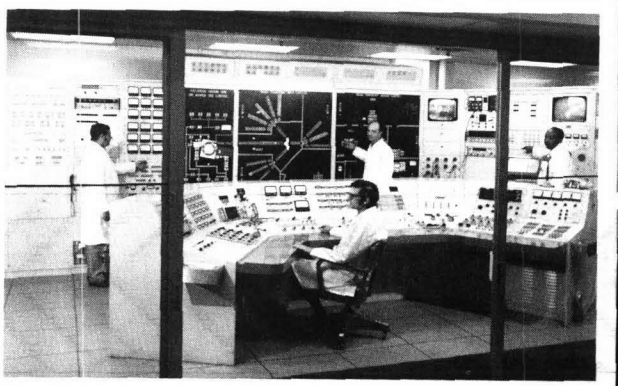
Fiscal Year 1974: $13,143,000

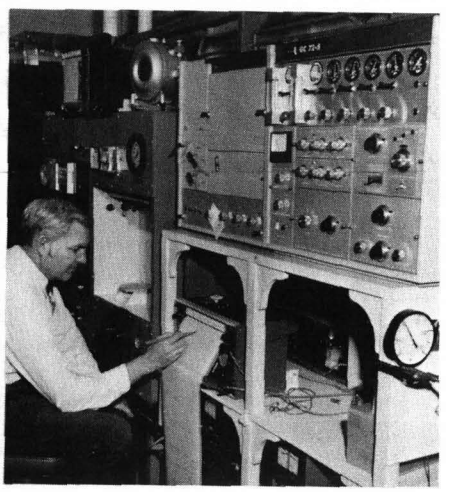
Materials and General Sciences Area

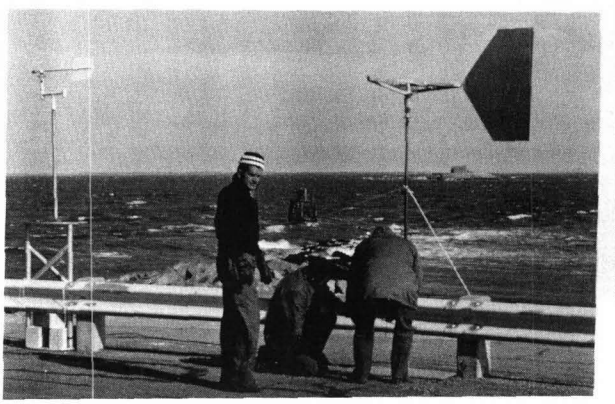
The Materials and General Sciences Area is an administrative grouping of chemists, metallurgists, and solid-state, optical, and nuclear scientists who (a) carry on interdisciplinary basic and applied research on the mechanical, electrical, thermal, magnetic, optical, and nuclear properties of matter, and (b) develop components, devices, and systems based on the phenomena and principles of the several disciplines involved











Associate Director of Research for Materials and General Sciences

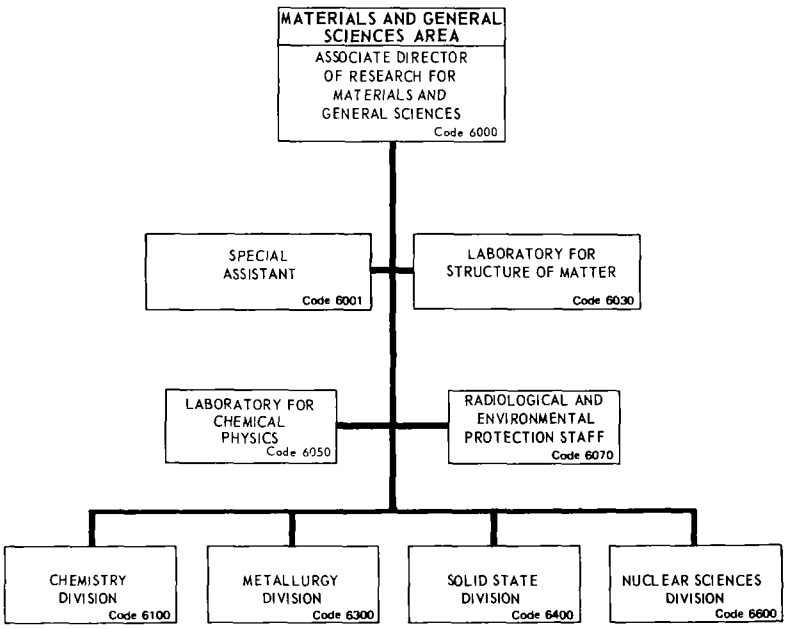
Dr. James H. Schulman

Dr. Schulman was born in Chicago, Illinois, on November 15, 1915. He received the degrees of B.S. (1939) and Ph.D. (1942), both in chemistry, from the Massachusetts Institute of Technology. He has held teaching positions at Suffolk University and M.I.T. and research positions at the M.I.T. Laboratory for Insulation Research and Sylvania Electric Products.

Since coming to NRL in 1946 to initiate research on luminescence in solids, he has served as Head of Branches in the Metallurgy and Solid State Divisions and as Superintendent of the Optical Physics Division. From August 1960 until December 1961, he was Deputy Scientific Director of the London Branch of the Office of Naval Research. In November 1964, Dr. Schulman was appointed to the Chair of Materials Sciences in recognition of his distinguished research accomplishments. In September 1967, he was appointed Associate Director of Research for Materials. In February 1971 the Materials Area was broadened to include the Optical Science and Nuclear Science Divisions and was renamed the Materials and General Sciences Area.

Dr. Schulman received the Applied Science Award of the NRL Branch of the Research Society of America (1957) and the Navy Superior Civilian Service Award (1965), both in recognition of his many contributions to the science of luminescent materials and phenomena, radiation-induced optical effects in solids, and the application of these effects to radiation dosimetry. He is author or co-author of over 90 papers and a book on these subjects, and he holds numerous patents.

Dr. Schulman is a Fellow of the American Physical Society, the Optical Society of America, and the American Association for the Advancement of Science, as well as an Associate Editor of two scientific journals. He has served on several panels and committees of the National Academy of Sciences and of various scientific societies.



Key Personnel

Name	*Title*
Dr. J.H. Schulman	Associate Director of Research for Materials and General Sciences
Dr. D.A. Patterson	Special Assistant
Dr. J. Karle	Chief Scientist, Laboratory for Structure of Matter
Dr. W.A. Zisman	Chief Scientist, Laboratory for Chemical Physics
Mr. L.A. Brauch	Head, Radiological and Environmental Protection Staff (Acting)
Dr. R.E. Kagarise	Superintendent, Chemistry Division
Mr. W.S. Pellini	Superintendent, Metallurgy Division
Dr. C.C. Klick	Superintendent, Solid State Division
Dr. J. McElhinney	Superintendent, Nuclear Sciences Division

LABORATORY FOR STRUCTURE OF MATTER

Basic Responsibilities

The Laboratory for Structure of Matter carries out experimental and theoretical investigations of the atomic, molecular, glassy, and crystalline structures of materials. The methods of x-ray, electron, and neutron diffraction are used in a broad program of structure studies which can form the basis for understanding and interpreting the results of research investigations in a wide variety of scientific disciplines.

Key Personnel

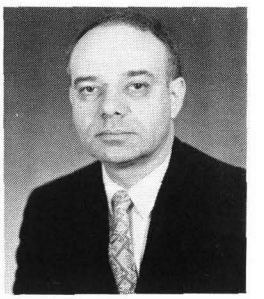
Name	*Title*
Dr. J. Karle	Chief Scientist, Laboratory for Structure of Matter

Personnel Complement

On Board: 11

Total Estimated R&D Funding

Fiscal Year 1974: $500,000



Dr. J. Karle

LABORATORY FOR CHEMICAL PHYSICS

Basic Responsibilities

The Laboratory for Chemical Physics carries out an interdisciplinary program of fundamental and applied research with especial emphasis on phenomena occurring at phase boundaries, i.e., the interfaces between solids and solids, solids and liquids, solids and gases, liquids and liquids, and liquids and gases. Currently, attention is being given to adhesion and adhesion promoters, wetting and spreading of liquids on solids including liquid metals and ceramics, surface electric properties of metals and plastics, interfacial phenomena in composite materials, the quantitative relation of dry film lubricants to shear strength and its pressure coefficient, the ability of insoluble monolayers to dampen capillary waves on liquids, the relation of interfacial properties to various aspects of blood clotting and bioadhesion.

Key Personnel

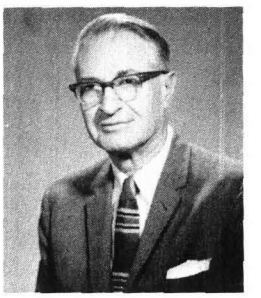
Name	*Title*
Dr. W.A. Zisman	Chief Scientist, Laboratory for Chemical Physics

Personnel Complement

On Board: 8

Total Estimated R&D Funding

Fiscal Year 1974: $250,000



Dr. W. A. Zisman

RADIOLOGICAL AND ENVIRONMENTAL PROTECTION STAFF

Basic Responsibilities

The Radiological & Environmental Protection Staff is assigned the responsibility for radiological safety and the overall minimization of pollution from all sources at NRL and its field stations. The NRL radiological protection program has three primary purposes: (1) to assure that all operations using ionizing and microwave radiation are safe and in compliance with Federal Regulations; (2) to provide employees with instruments, instructions, and assistance to assure radiological safety in the performance of their duties; and (3) to conduct research in radiation dosimetry, instrumentation, and methodology. The environmental control responsibilities are to: (1) review programs to identify sources of pollution at NRL; (2) recommend preventative or corrective measures necessary to reduce or eliminate pollution; (3) monitor the air and water to determine compliance with pertinent Federal or Navy Rules and Regulations; and (4) conduct research in environmental control.

Key Personnel

Name	*Title*
Mr. L.A. Brauch	Head, Radiological & Environmental Protection Staff
Mr. T.L. Johnson	Head, Research Section
Mr. R.B. Luersen	Head, Accelerators & Analysis Section
Mr. J.N. Stone	Head, Operations Section
Mr. J.N. Stone	Head, Environmental Control Section

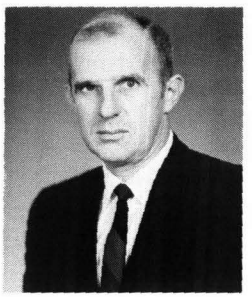
Mr. L. A. Brauch

Personnel Complement

On Board: 17

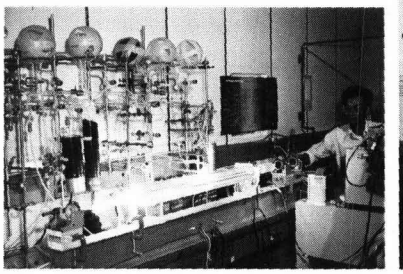
Total Estimated R&D Funding

Fiscal Year 1974: $377,000

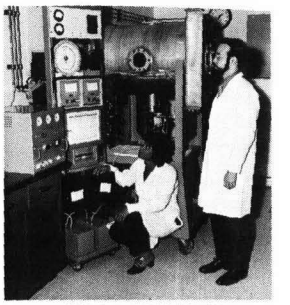


Dr. R. E. Kagarise

Chemistry Division

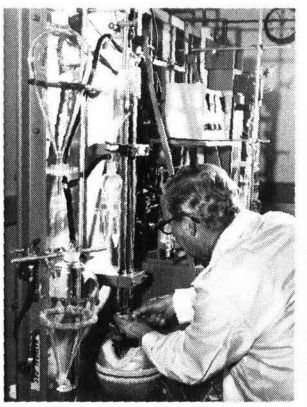


CHEMICAL LASER



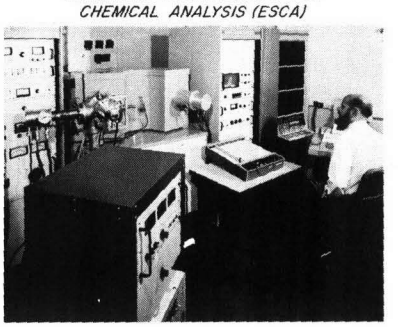
FIRE SUPPRESSION

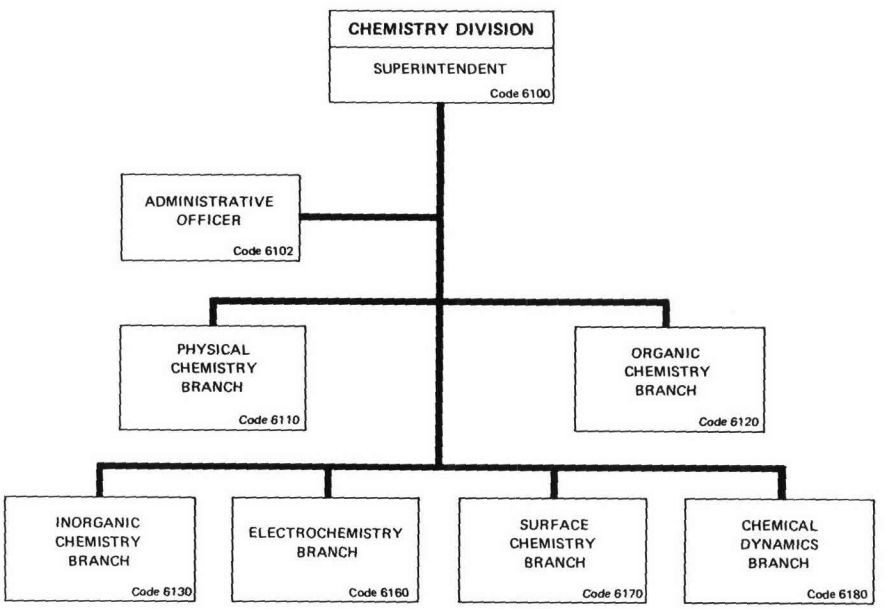
- PHYSICAL CHEMISTRY
- ORGANIC CHEMISTRY
- INORGANIC CHEMISTRY
- ELECTROCHEMISTRY
- SURFACE CHEMISTRY
- CHEMICAL DYNAMICS



CHEMICAL SYNTHESIS

ELECTRON SPECTROSCOPY FOR CHEMICAL ANALYSIS (ESCA)





Basic Responsibilities

The Chemistry Division conducts a diversified research and development program in the general areas of physical, organic, inorganic and analytical chemistry. Specialized technological programs within these fields include polymeric materials (protective coatings, composites, drag reducing agents, adhesives, and high temperature lubricants), ceramics, advanced inorganic fluids, fuel technology and combustion, fire suppression, chemical lasers, electrochemical power sources, and atmosphere analysis and control (mainly in nuclear submarines).

Branches

Physical Chemistry
- Applications of spectroscopic techniques
- Kinetics of gas phase reactions
- Chemical lasers and energy transfer
- Thermal and oxidative degradation
- Trace analysis

Organic Chemistry
- Synthesis of unique polymers
- Functional organic coatings
- High strength composites
- Photophysical processes in polymers
- Gas phase organic reactions

Inorganic Chemistry
- Submarine air purification
- Solid state chemistry
- Ceramic materials
- Synthesis of novel inorganic compounds
- Corrosion prevention

Electrochemistry
- Fuel cells
- Fundamental electrode reactions
- Electrochemical power sources

Surface Chemistry
- Lubricants
- Surface properties of fibers
- Adhesion and structural adhesives
- Surface and solid kinetics
- Drag reduction

Chemical Dynamics
- Atmosphere analysis and control
- Distillate fuels research
- Autoxidation and combustion dynamics
- Fire suppression
- Personnel protection in fires

Key Personnel

Name	*Title*
Dr. R.E. Kagarise	Superintendent
Dr. F.E. Saalfeld	Head, Physical Chemistry Branch
Dr. L.B. Lockhart, Jr.	Head, Organic Chemistry Branch
Dr. W.B. Fox	Head, Inorganic Chemistry Branch
Mr. S. Schuldiner	Head, Electrochemistry Branch
Dr. N.L. Jarvis	Head, Surface Chemistry Branch
Dr. H.W. Carhart	Head, Chemical Dynamics Branch

Personnel Complement

On Board: 122

Total Estimated R&D Funding

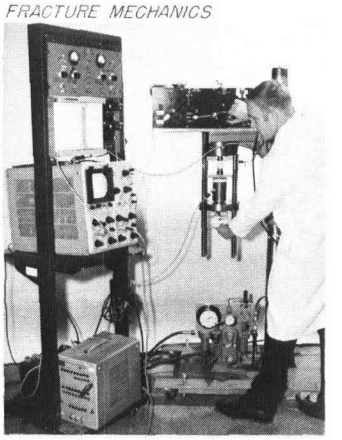
Fiscal Year 1974: $5,500,000

Metallurgy Division

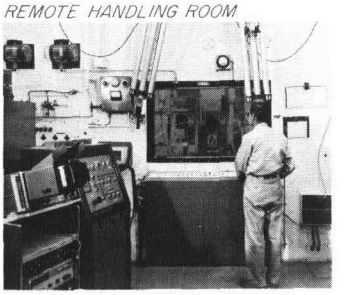
Mr. W. S. Pellini

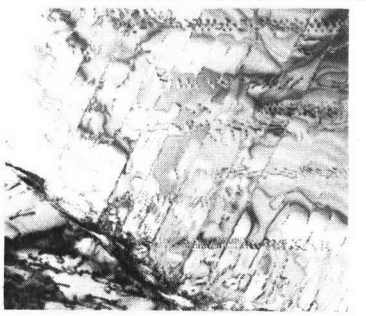
- ANALYSIS AND MICROSCOPY
- METAL PHYSICS
- TRANSFORMATIONS AND KINETICS
- STRENGTH OF METALS
- REACTOR MATERIALS

FRACTURE MECHANICS

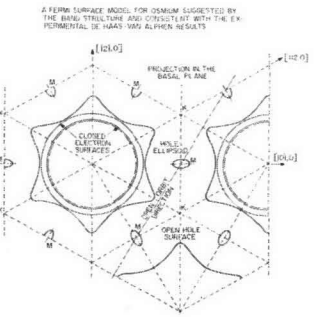


REMOTE HANDLING ROOM

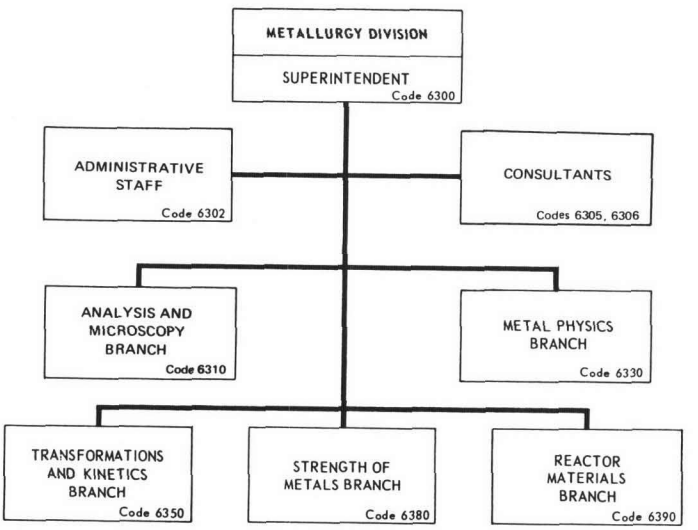




COPLANAR SLIP:
S.C.C. IN Ti ALLOYS



FERMI SURFACE MODEL FOR OSMIUM



Basic Responsibilities

The Metallurgy Division is concerned with basic and applied research in physical, mechanical, chemical, and structural aspects of metals. Metal physics activities center in the investigation of electronic transport properties in terms of quantum-mechanical principles. The mechanical studies are largely related to the attainment of quantitative analytical capabilities in the definition of plastic flow and fracture properties. The chemical interests involve electrochemical aspects of various forms of catastrophic corrosion, particularly the complex phenomenon of stress corrosion cracking. The metal structure studies cover a broad range of topics including strengthening mechanisms, role of defect structures, microscale separation events in fracture, transformation processes, and mechanisms of environmental effects. This broad range of activity evolves from a balance staff which includes materials scientists, physical metallurgists, physicists, chemists, and mechanical engineers. Important consultative services on subjects ranging from concept formulation to system development are provided to the Navy and other DOD activities.

Branches

Analysis and Microscopy
- Microstructural characterization and crystal mechanics
- Composition and phase analysis
- Micromechanisms of crack growth

Metal Physics
- Fermi surface studies of pure metals and alloys
- Electronic, magnetic, and optical properties of metallic materials
- Charged particle irradiation effects
- Electronic, thermal and optical properties of liquid metals
- Response of metallic systems to high rates of energy deposition

Transformations and Kinetics
- Phase transformations, solidification, metallic crystal growth
- Thermodynamics of lattice defects, crystal plasticity
- Applications of holography to metallurgical studies
- Preparation and processing of electronically active alloys

Strength of Metals
- Characterization criteria
- Fracture-safe design parameters
- Role of processing for high strength metals
- Macroscale and microscale aspects of metal separation processes
- Corrosion science related to advanced alloys
- Marine corrosion and cathodic protection

Reactor Materials
- Environmental factors in neutron irradiation
- Basic mechanisms of radiation damage
- Spectral analyses and dosimetry
- Characterization criteria for mechanical damage

Key Personnel

Name	*Title*
Mr. W.S. Pellini	Superintendent
Dr. M.R. Achter	Consultant
Dr. P. Shahinian	Consultant
Mr. D.I. Walter	Head, Analysis and Microscopy Branch
Dr. A.I. Schindler	Head, Metal Physics Branch
Dr. M.E. Glicksman	Head, Transformations and Kinetics Branch
Mr. R.J. Goode	Head, Strength of Metals Branch
Mr. L.E. Steele	Head, Reactor Materials Branch

Personnel Complement

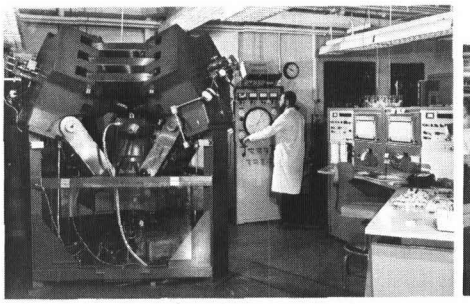
On Board: 105

Total Estimated R&D Funding

Fiscal Year 1974: $4,800,000

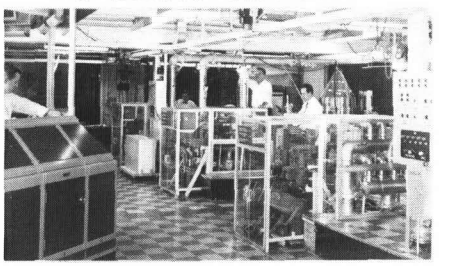
Solid State Division

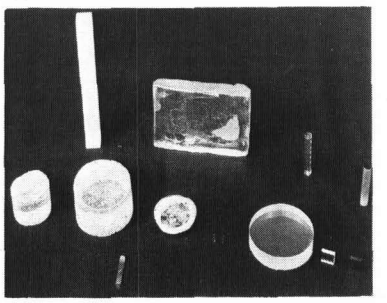
Dr. C. C. Klick



TETRAHEDRAL PRESS AND X-RAY EQUIPMENT

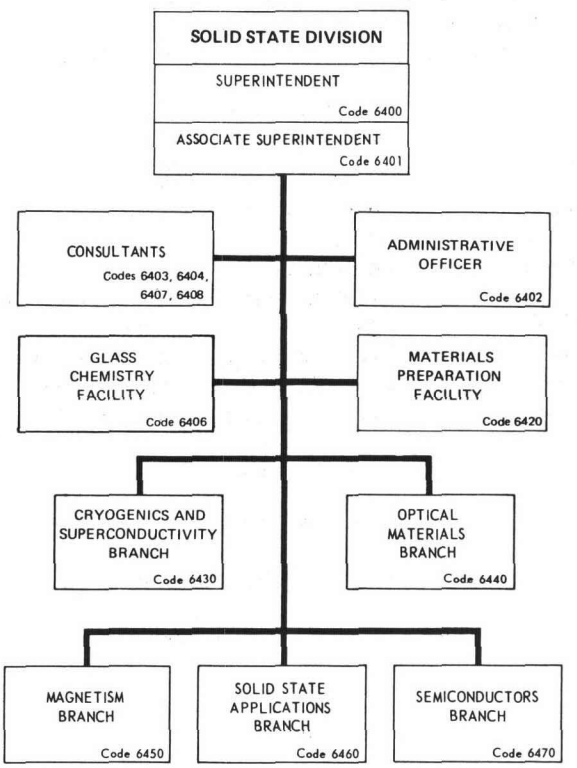
HIGH MAGNETIC FIELD FACILITY





LUMINESCENT PROPERTIES OF GLASS

- GLASS CHEMISTRY
- MATERIALS PREPARATION
- CRYSTAL PHYSICS
- OPTICAL MATERIALS
- MAGNETISM
- SOLID STATE APPLICATIONS
- SEMICONDUCTORS



Basic Responsibilities

The Solid State Division is concerned with basic and applied research in the physics of materials, principally solids, and with the interaction of matter with light and nuclear radiation. Its purposes are to increase understanding of the physical principles involved, to pursue applications of military and industrial problems, and to serve as a corps of experts in solids for the Laboratory specifically and the Navy generally. The research work of the Division is fairly comprehensive in magnetism, superconductivity, semiconductors, and insulators. Important work is also carried on in surface physics, structure and optical properties of glass, properties of materials at high magnetic fields, the effects of high pressures on solids, and radiation damage. Applications in solid state dosimeters, thin magnetic films, superconducting electronics, information storage systems, and infrared detectors are being pursued actively.

Branches and Facilities

Glass Chemistry
- Glass research and materials fabrication

Materials Preparation
- Preparation and development of magnetic, dielectric, optic and semiconducting materials

Cryogenics and Superconductivity
- High-pressure effects
- Superconducting materials
- Superconducting electronics

Optical Materials
- Electronic properties of nonmetal crystals and glasses
- Radiation induced defects, color centers
- Lattice dynamics

Magnetism
- Electronic and nuclear paramagnetism
- Spin-ordered magnetic phenomena
- Rare earth magnetic materials
- Magnetic properties of amorphous materials

Solid State Applications
- Environmental effects on semiconductor and dielectric materials and devices
- Semiconductor applications
- IR light sources such as semiconductor lasers

Semiconductors
- Electronic energy levels and band structure
- Physical properties of semiconductors
- Infrared magneto optics
- Infrared detector physics
- Raman spectroscopy

Key Personnel

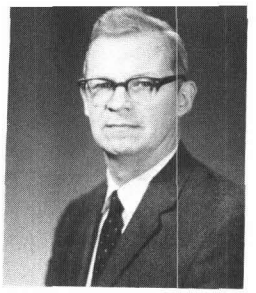
Name	*Title*
Dr. C.C. Klick	Superintendent
Mr. J.R. Clement	Associate Superintendent (Acting)
Dr. H.B. Rosenstock	Consultant Staff: Theory
Mr. R.J. Ginther	Head, Glass Chemistry Facility
Dr. P.L. Smith	Consultant Staff: Ceramics
Dr. M. Hass	Consultant Staff: Experiment
Mr. H. Lessoff	Head, Materials Preparation Facility (Acting)
Dr. R.A. Hein	Head, Cryogenics and Superconductivity Branch
Dr. F.W. Patten	Head, Optical Materials Branch (Acting)
Dr. G.T. Rado	Head, Magnetism Branch
Dr. D.L. Mitchell	Head, Solid State Applications Branch
Dr. S. Teitler	Head, Semiconductors Branch

Personnel Complement

On Board: 98

Total Estimated R&D Funding

Fiscal Year 1974: $4,041,000

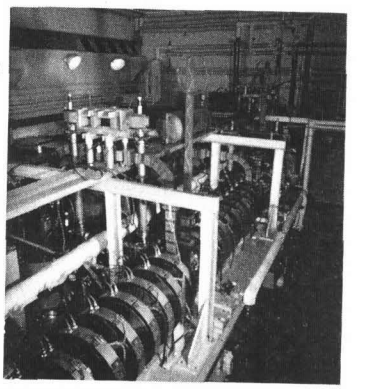


Dr. J. McElhinney

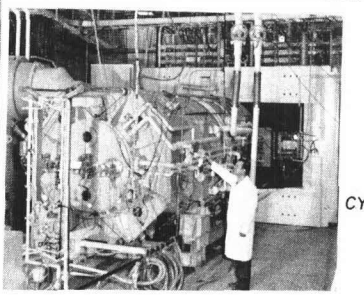
Nuclear Sciences Division

- CYCLOTRON
- LINAC
- THEORY
- VAN DE GRAAFF
- X-RAY OPTICS

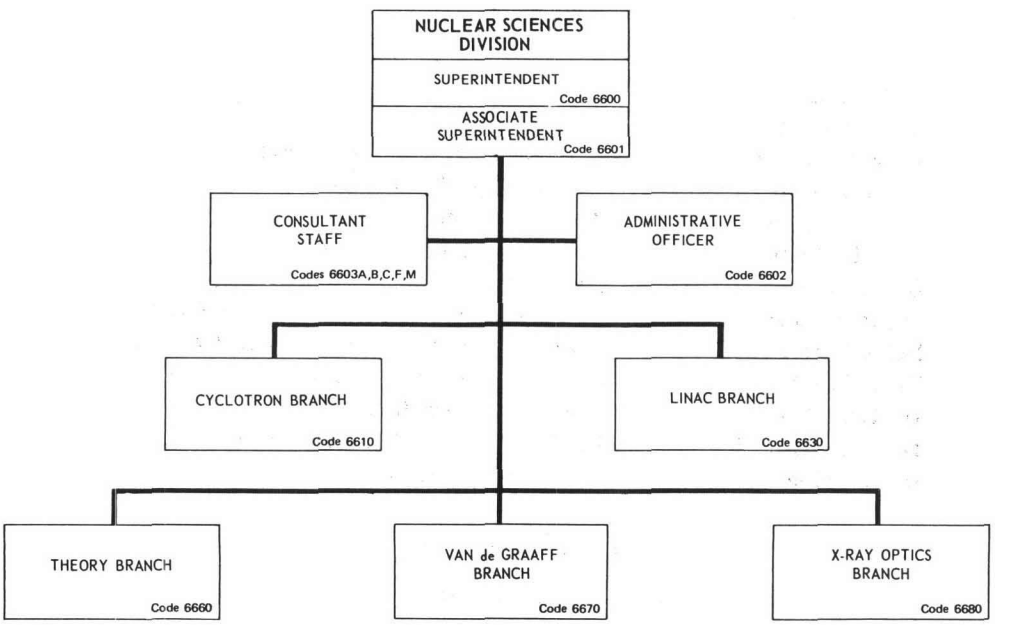
LINAC



VAN DE GRAAFF



CYCLOTRON



Basic Responsibilities

The Nuclear Sciences Division is engaged in a broad program of research and development in nuclear and atomic sciences. Included are: radiation damage studies, transient radiation effects in solid state devices, materials analysis by x-ray fluorescence and nuclear reactions, ion implantation to modify devices and materials, neutron beams for cancer therapy, radio-isotope production, and radiation instrumentation. The Division operates a 75 MeV sector focussing cyclotron, a 60 MeV electron linear accelerator, a 5 MV Van de Graaff, and several smaller accelerators and radiation sources. A strong theoretical and experimental research effort supports the above program.

Staff Activities

Consultant Staff
- Radiation dosimetry
- Electromagnetic pulse effects (EMP)
- Terrestrial and planetary radiation belts
- Radiation effects on satellite components
- Radiation curing of adhesives
- Radiations from nuclear power sources
- Radiation instrumentation

Branches

Cyclotron
- Charged particle nuclear reactions
- Nuclear structure
- Charged particle scattering
- Neutron beams for cancer therapy
- Ion-induced x-rays
- Radioisotope production
- Radiation damage

Theory
- Nuclear reactions
- Nuclear structure
- Coherent bremsstrahlung
- Electron scattering by nuclei
- Scattering theory
- High-intensity laser beam propagation
- Deposition of energy by charged particles

Linac
- Electron scattering
- Nuclear excitation
- Neutron capture reactions
- Transient radiation effects on electronics

Linac (continued)
- Radioactivation analysis
- Measurement of neutrons and high-energy x rays from pulsed sources

Van de Graaff
- Materials analysis by means of charged particle beams
- Implantation of ions into solids
- Radiation effects caused by high energy charged particle beams
- Crystal studies by means of particle channeling techniques
- Ion-induced x-rays

X-Ray Optics
- X-ray spectral measurements
- X-ray fluorescence analysis
- X-ray production by charged particles
- X-ray shielding
- Plasma diagnostics by x-ray measurements
- Metal alloy analysis by x rays

Key Personnel

Name	*Title*
Dr. J. McElhinney	Superintendent
Dr. E.A. Wolicki	Consultant and Associate Superintendent (Acting)
Mr. F.H. Attix	Consultant
Dr. J.W. Butler	Consultant
Mr. D.C. Cook	Consultant
Dr. B.J. Faraday	Consultant
Dr. K.W. Marlow	Consultant
Dr. R.O. Bondelid	Head, Cyclotron Branch
Dr. T.F. Godlove	Head, Linac Branch
Dr. A.W. Saénz	Head, Theory Branch
Dr. K.L. Dunning	Head, Van de Graaff Branch
Mr. L.S. Birks	Head, X-Ray Optics Branch

Personnel Complement

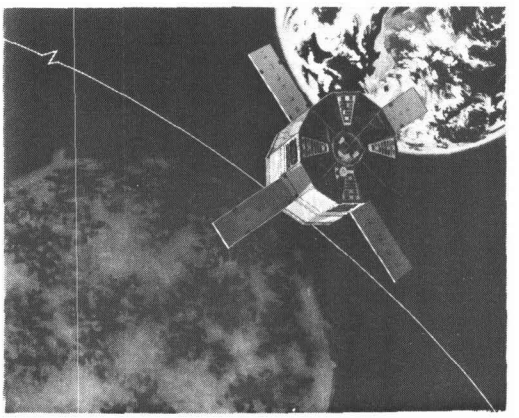
On Board: 100

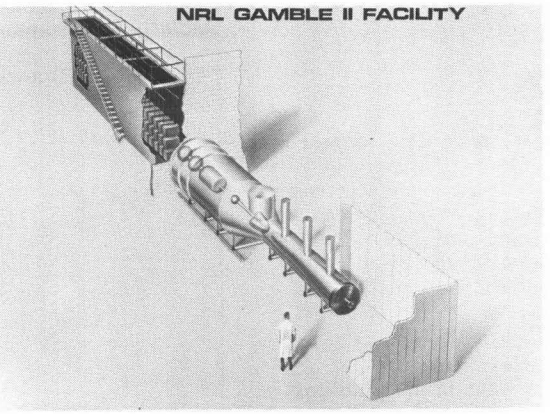
Total Estimated R&D Funding

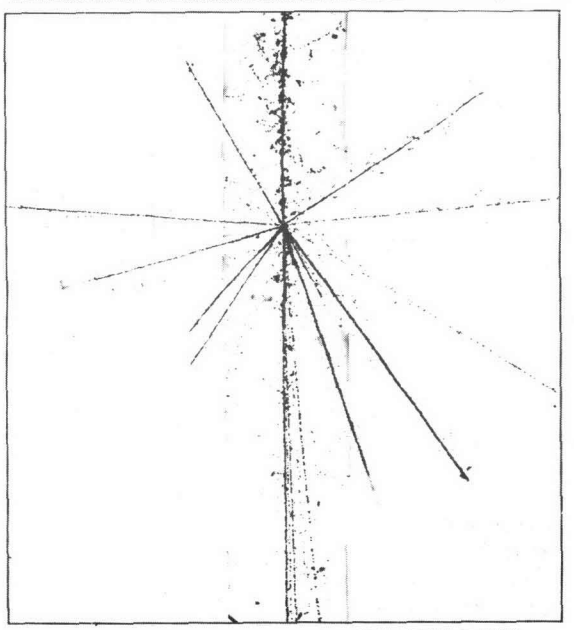
Fiscal Year 1974: $5,000,000

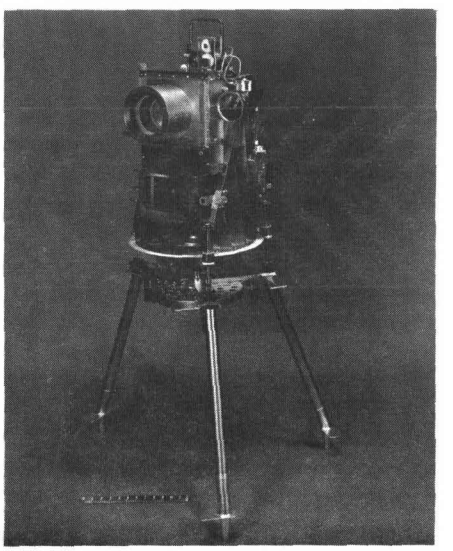
Space Science and Technology Area

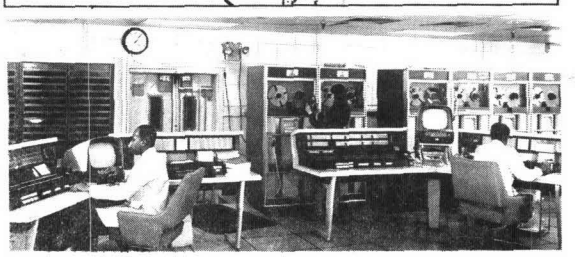
The Naval Research Laboratory conducts basic and applied research in upper air physics, astronomy, and astrophysics to improve naval capabilities in communications, navigation, detection, surveillance, and other fields; the investigations are made by means of several radio telescopes and a wide variety of space probes. Both experimental and theoretical techniques are used to conduct plasma research, to understand more fully natural and man-made plasma phenomena, and to develop controlled thermonuclear power sources. The area is involved also in the study and application of advanced mathematical techniques and in the many approaches afforded by the computer sciences.

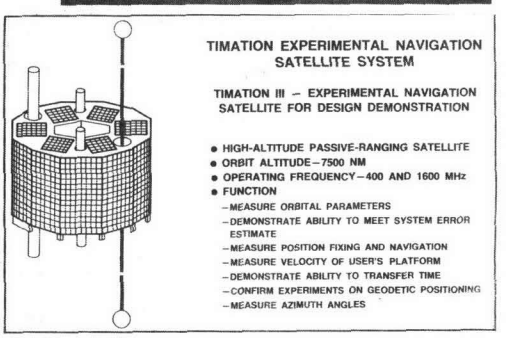




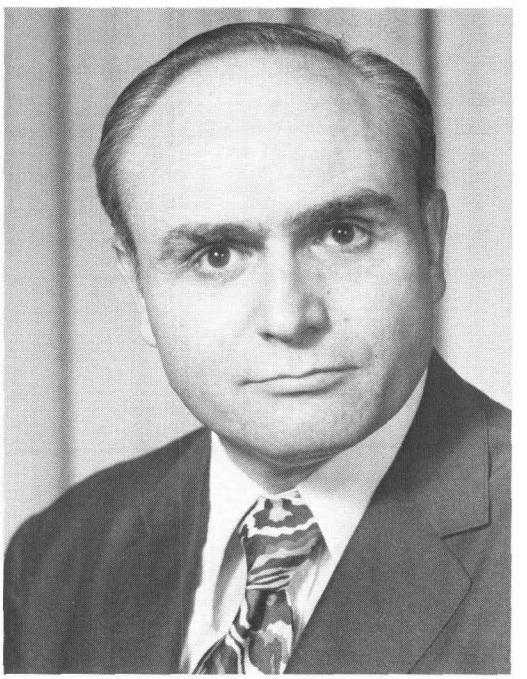








Associate Director of Research for Space Science and Technology



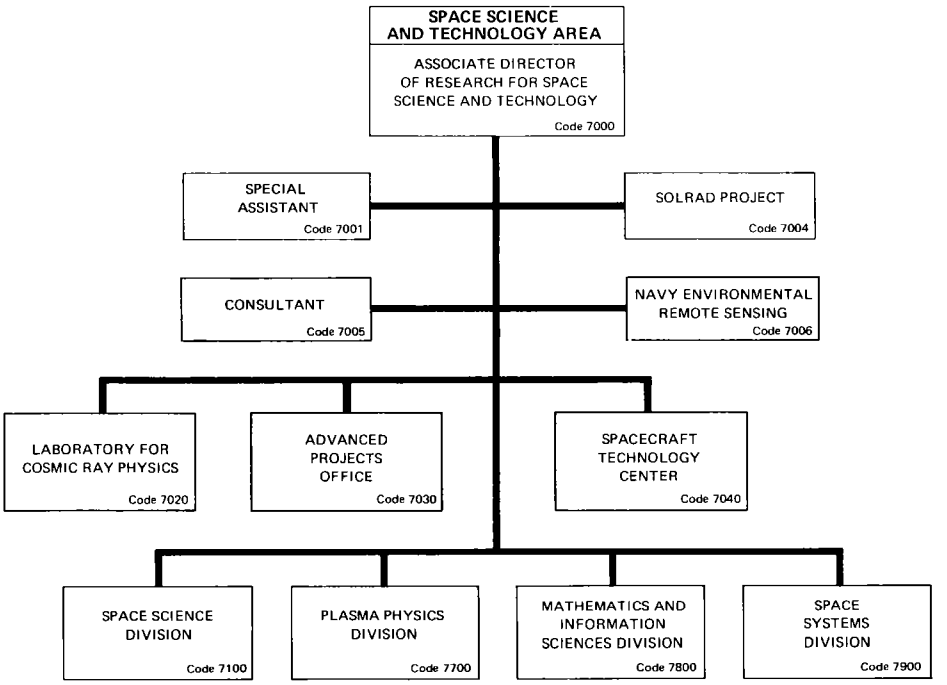
Dr. Herbert Rabin

Dr. Rabin was born in Milwaukee, Wisconsin, on November 14, 1928. He received a B.S. degree in physics from the University of Wisconsin in 1950, an M.S. degree in physics from the University of Illinois in 1951, and a Ph.D. degree in physics from the University of Maryland in 1959.

He has been employed at the Naval Research Laboratory since 1952, working in the fields of high-energy gamma ray and electron facilities, radiation dosimetry, solid state studies of lattice defects, and nonlinear optics and laser physics. In these research areas Dr. Rabin has authored or coauthored well over a hundred papers and conference presentations. In addition, Dr. Rabin holds five patents.

Prior to his present appointment Dr. Rabin held several supervisory positions at NRL, the most recent being Head, Quantum Optics Branch, Optical Sciences Division. He has taught courses in the Physics Department at George Washington University; he was a visiting scientist at the Techniche Hochschule in Stuttgart, Germany; and he was a consultant to the school of Engineering of the University of Sao Paulo, Sao Carlos, Brazil, under sponsorship of the Pan American Union.

Dr. Rabin is a Fellow of the American Physical Society and holds membership in the Optical Society of America, the Philosophical Society of Washington, the American Association for the Advancement of Science, the American Institute of Aeronautics and Astronautics, and several honorary societies. He is also a corresponding member of the Brazilian Academy of Sciences. Dr. Rabin received the Navy Meritorious Civilian Service Award in 1969 and the E.O. Hulburt Annual Science Award for 1970.



Key Personnel

Name	*Title*
Dr. H. Rabin	Associate Director of Research for Space Science and Technology
Mr. J.M. Shaw, Jr.	Special Assistant
Mr. E.W. Peterkin	Technical Project Manager
Dr. J.W. Schwartz	Consultant
Dr. V.E. Noble	Special Assistant for Navy Environmental Remote Sensing
Dr. M.M. Shapiro	Head, Laboratory for Cosmic Ray Physics
Mr. R.D. Mayo	Head, Advanced Projects Office
Mr. P.G. Wilhelm	Head, Spacecraft Technology Center
Dr. H. Friedman	Superintendent, Space Science Division
Dr. R.A. Shanny	Superintendent, Plasma Physics Division
Dr. P.B. Richards	Superintendent, Mathematics & Information Sciences Division
Mr. N.W. Guinard	Superintendent, Space Systems Division

LABORATORY FOR COSMIC RAY PHYSICS

Basic Responsibilities

The Laboratory for Cosmic Ray Physics conducts a program of fundamental investigations of cosmic radiation — its composition and spectra, its origin, its propagation through space, its interactions with particles and fields in the regions of space that it traverses, and its role in astrophysics. Solar energetic particles constitute another major area of research. The program is framed so as to be broadly responsive to the anticipated technical requirements of the Navy and the general research and development program of the Department of Defense.

Key Personnel

Name	*Title*
Dr. M.M. Shapiro	Chief Scientist, Laboratory for Cosmic Ray Physics
Mr. N. Seeman	Head, Gamma Rays
Dr. R. Silberberg	Senior Scientist
Mr. F.W. O'Dell	Senior Scientist

Dr. M. M. Shapiro

Personnel Complement

On Board: 20

Total Estimated R&D Funding

Fiscal Year 1974: $820,000

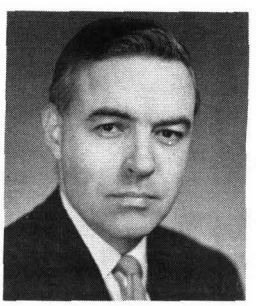
SOLRAD PROJECT

Basic Responsibilities

The SOLRAD Project was established to support NAVAIR exploratory development tasks in solar x-ray monitoring, and specifically to (1) develop, construct, test, evaluate, and provide launch support of SOLRAD satellites, (2) track, command, and acquire satellite telemetry, and (3) reduce, analyze, and transmit solar emission data for scientific and application purposes.

Key Personnel

Name	*Title*
Mr. E.W. Peterkin	Technical Project Manager
Mr. R.W. Kreplin	Scientific Program Manager
Mr. C.H. Chrisman	Assistant Manager for Data Processing
Mr. P.W. Wilhelm	Assistant Manager for Space Craft
Mr. G.E. Leavitt	Technical Assistant for Experiments Electronics



Mr. E. W. Peterkin

Manpower Support: 36 man-years

Total Estimated R&D Funding

Fiscal Year 1974: $2,500,000

ADVANCED PROJECTS OFFICE

Basic Responsibilities

The Advanced Projects Office is responsible for the NRL program sponsored by the CNM PM-16/SPO. The Advanced Projects Office is responsible for all management functions of the entire NRL effort in this advanced project and provides the NRL external interface for the program.

Key Personnel

Name	*Title*
Mr. R.D. Mayo	Manager, Advanced Projects Office
Mr. L.M. Hammarstrom	Head, Advanced Concepts Staff
Mr. F.V. Hellrich	Head, Systems Development Branch

Mr. R. D. Mayo

Personnel Complement

On Board: 37

Total Estimated R&D Funding

Fiscal Year 1974: $15,530,000

SPACECRAFT TECHNOLOGY CENTER

Basic Responsibilities

The Spacecraft Technology Center is responsible for providing complete spacecraft systems for purposes of conducting research and development in the space environment. This involves a broad and complete spectrum of activities ranging from system concept formulation, preliminary and detailed design, prototype development through to complete flight systems. The Center maintains all of the necessary special facilities for aerospace type fabrication and environmental testing and the expertise which is generally required in the spacecraft system. The Center also maintains dedicated ground stations for the purpose of transmitting command/control signals to, and receiving and analyzing telemetered data from, those of its spacecraft which have been placed into orbit.

Key Personnel

Name	*Title*
Mr. P.G. Wilhelm	Head, Spacecraft Technology Center
Mr. A.C. Salvato	Product Design Section
Mr. R.T. Beal	Special Mechanical Systems Section
Mr. R.S. Rovinski	Satellite Structures Design Section
Mr. F.W. Raymond	Engineering Physics Section
Mr. J.G. Winkler	Telemetry Systems Section
Mr. L.E. Hearton	R. F. Systems Section
Mr. R.E. Eisenhauer	Satellite Digital Systems Section

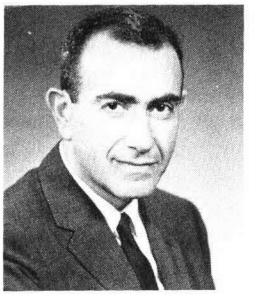
Mr. P.G. Wilhelm

Personnel Complement

On Board: 73

Total Estimated R&D Funding

Fiscal Year 1974: $12,969,000



Space Science Division

Dr. H. Friedman

ADVANCED SPACE SENSING APPLICATIONS

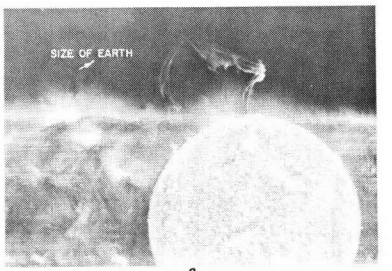
UPPER AIR PHYSICS

RADIO ASTRONOMY

ROCKET SPECTROSCOPY

• • • • • • • • • •

E. O. HULBURT CENTER FOR SPACE RESEARCH



HELIUM+ (304 Å) SOLAR IMAGE SHOWING HUGE ERUPTION

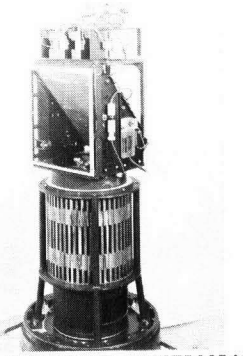
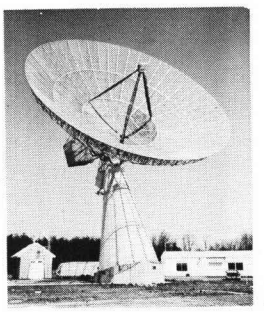
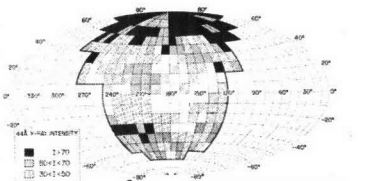


IMAGE - CONVERTER SPECTROGRAPH FOR FAR-UV ROCKET ASTRONOMY

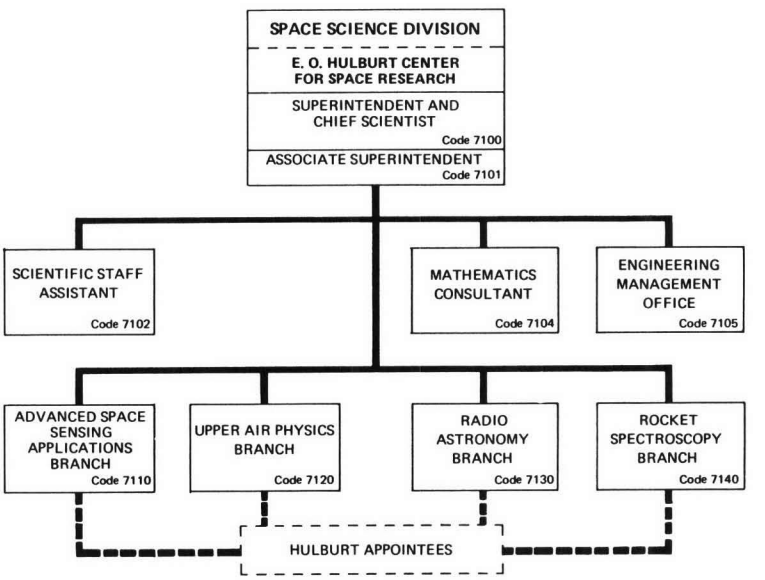
RADIO TELESCOPE MARYLAND POINT



FAR-ULTRAVIOLET PHOTOGRAPH OF EARTH



44 Å X-RAY INTENSITY MAP OF THE OBSERVED SKY



Basic Responsibilities

The Space Science Division conducts research, development, and tests in the fields of upper air physics, astronomy, and astrophysics. Satellites and rockets are used to obtain information on radiation from the sun and celestial sources, and to study the composition and behavior of the ionosphere. Radio telescopes are used for astronomical observations. Results are of importance to radio communications, to utilization of the space environment, and to the fundamental understanding of natural radiation phenomena.

Branches

Advanced Space Sensing Applications
- Active and passive sensor development for remote sensing
- Satellite radar altimetry
- Remote sensing of ocean environment and surface properties
- Remote sensing of arctic conditions
- Determining volume of oil spills at sea

Upper Air Physics
- Gamma-ray, x-ray, ultraviolet, and infrared astronomy
- Aeronomy
- Solar x-ray monitoring satellites
- Electronic imaging studies
- Meteor astronomy

Radio Astronomy
- Galactic and extragalactic radio astronomy
- VLBI (very long basic interferometry)

Radio Astronomy (continued)
- Intergalactic gases
- Atmospheric radiation
- Extraterrestrial radio radiation

Rocket Spectroscopy
- X-ray and ultraviolet solar spectroscopy
- Spectroheliographic and coronagraphic research
- Laboratory astrophysics
- XUV spectroradiometry
- Apollo telescope mission solar research

E.O. Hulburt Center for Space Research

The program is that of the combined Upper Air Physics, Rocket Spectroscopy, and Radio Astronomy Branches. It allows graduate and postgraduate students and visiting faculty members to cooperate with NRL in space research.

Key Personnel

Name	*Title*
Dr. H. Friedman	Superintendent
Dr. P. Mange	Associate Superintendent
Mr. B. Yaplee	Head, Advanced Space Sensing Applications Branch
Dr. T.A. Chubb	Head, Upper Air Physics Branch
Mr. C.H. Mayer	Head, Radio Astronomy Branch
Dr. R. Tousey	Head, Rocket Spectroscopy Branch
Dr. H. Friedman	Chief Scientist, Hulburt Center

Personnel Complement

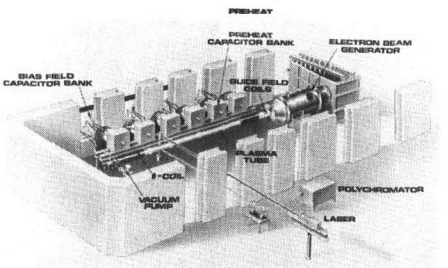
On Board: 145

Total Estimated R&D Funding

Fiscal Year 1974: $16,500,000

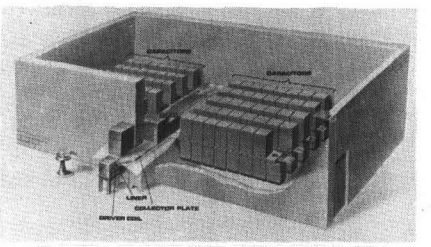
Dr. R. A. Shanny

Plasma Physics Division

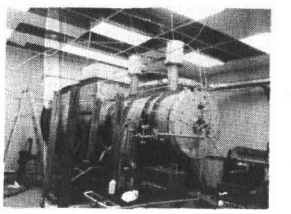


RELATIVISTIC ELECTRON BEAM–PLASMA INTERACTION EXPERIMENT

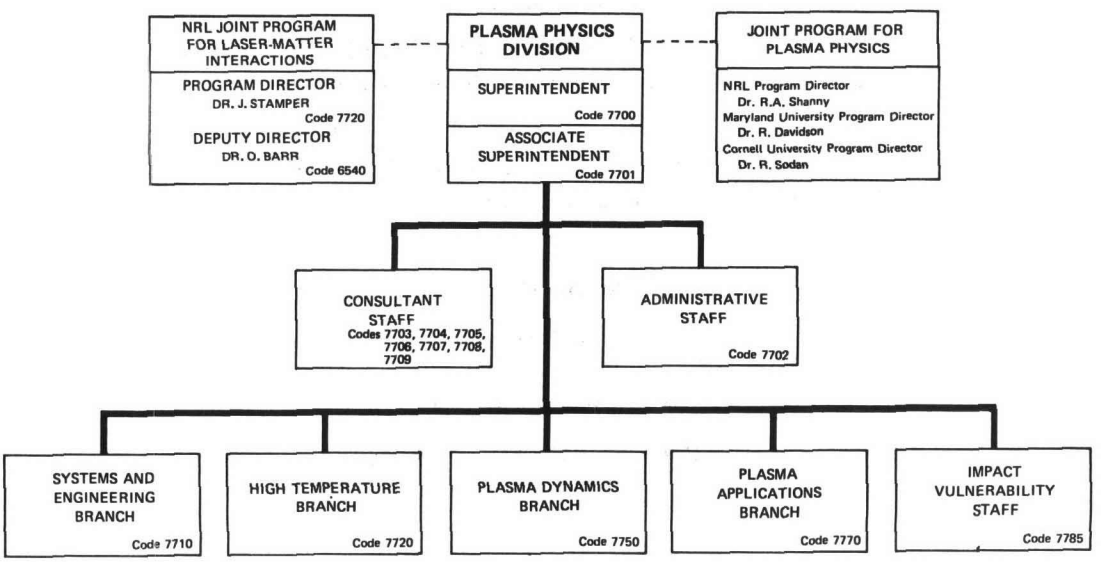
- HIGH TEMPERATURE PHYSICS
- PLASMA DYNAMICS
- PLASMA APPLICATIONS
- SYSTEMS & ENGINEERING
- IMPACT VULNERABILITY



SUZY II–500 kJ COLLAPSING LINER EXPERIMENT



GAMBLE I ELECTRON BEAM GENERATOR



Basic Responsibilities

The Plasma Physics Division conducts both basic and applied experimental and theoretical research. Examples of effort underway include: fusion physics and the generation and containment of high temperature plasmas, directed toward eventual power sources, laser produced plasmas, laboratory astrophysics, collision-free shock waves, the behavior of the ionosphere as a partial plasma, electron beam experiments, and the production and effects of hypervelocity particles.

Branches

High Temperature Physics
- Generation and diagnostics of high temperature plasmas
- Experimental research of ultra short wavelength lasers
- Experimental study of plasma chemistry
- Experimental study of laser-matter interactions

Plasma Dynamics
- Theoretical and numerical simulation studies of problems in nonlinear plasma dynamics
- Global ionospheric modeling
- Numerical simulation of super high density plasmas

Plasma Applications
- Production of intense relativistic electron beams
- Electron beam propagation and focussing
- Interaction of high current relativistic electron beams with plasmas
- Experimental research in high power exploding wires
- Application of high current relativistic electron beams to microwave generation

Systems and Engineering
- Technical support of major division experiments

Impact Vulnerability
- Vulnerability mechanics
- Hypervelocity kill mechanism
- Hypervelocity impact mechanics

Key Personnel

Name	*Title*
Dr. R. A. Shanny	Superintendent
Mr. J.D. Brown	Associate Superintendent
Mr. J.D. Shipman	Consultant
Dr. K. Hain	Consultant
Mr. M.P. Young	Consultant
Dr. J.P. Boris	Consultant
Dr. W.C. Lupton	Consultant
Dr. A.E. Robson	Consultant
Dr. A.W. Ali	Consultant
Mr. E.A. McLean	Acting Head, High Temperature Physics Branch
Dr. T.C. Coffey	Head, Plasma Dynamics Branch
Dr. L.S. Levine	Head, Plasma Applications Branch
Mr. J.D. Brown	Acting Head, Systems and Engineering Branch
Mr. W.W. Atkins	Head, Impact Vulnerability Staff

Personnel Complement

On Board: 120

Total Estimated R&D Funding

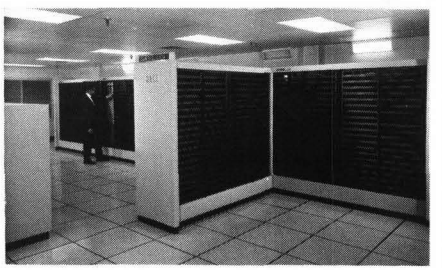
Fiscal Year 1974: $8,182,000

Dr. P. B. Richards

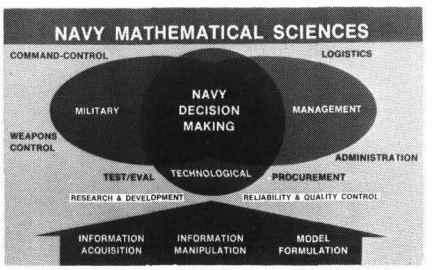
Mathematics and Information Sciences Division

- RESEARCH COMPUTATION CENTER
- MATHEMATICS RESEARCH CENTER
- OPERATIONS RESEARCH BRANCH

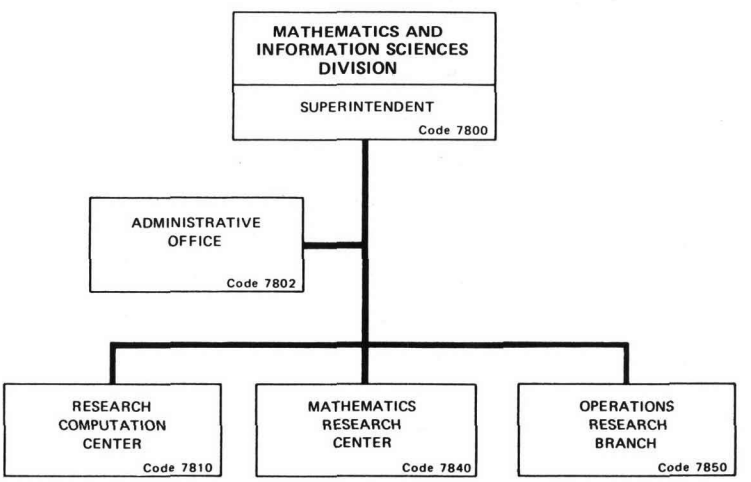
RESEARCH COMPUTATION CENTER



CDC 3800 COMPUTER



MATHEMATICS SCIENCE COORDINATION



Basic Responsibilities

The Mathematics and Information Sciences Division conducts research in mathematics and the information sciences to meet the short and long range needs of the Navy and the Department of Defense; assists in the solution of technical and operational/command-control problems of the Navy and DOD through the application of mathematics and the information sciences; and also operates and maintains a major computing facility to service NRL.

Branches

Research Computation
- Central Computer Operation
- Time sharing computer operation
- Data translation services
- Customer support services
- Operating systems support
- Applications programming
- ADP logistics services

Operations Research
- Image processing research
- Radiative transfer
- Potential theory applications
- Signal analysis

Operations Research (continued)
- Satellite trajectory studies
- Space mission analysis
- Military OR methods
- Management techniques
- Formula manipulation on computers

Mathematics Research
- Ordinary differential equations
- Approximation theory
- Stability theory
- Computer sciences
- Numerical analysis
- Optimization methods

Key Personnel

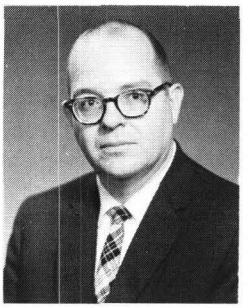
Name	*Title*
Dr. P.B. Richards	Superintendent
Mr. A.B. Bligh	Head, Research Computation Center
Dr. A.J. Skalafuris	Head, Mathematics Research Center
Dr. A.F. Petty	Head, Operations Research Branch

Personnel Complement

On Board: 73

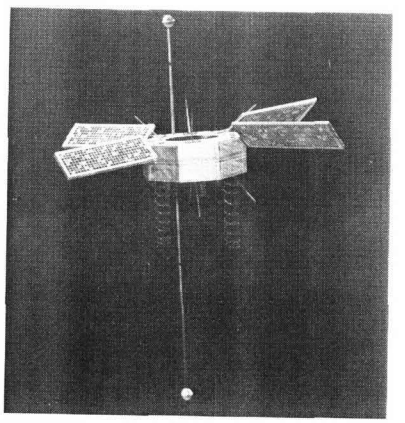
Total Estimated R&D Funding

Fiscal Year 1974: $683,000



Space Systems Division

Mr. N. W. Guinard

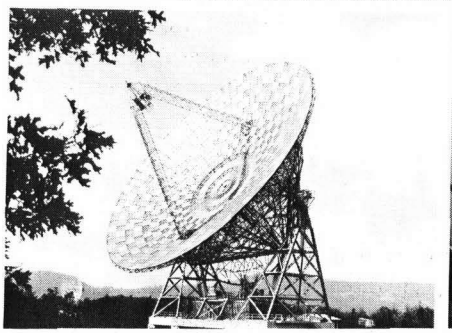


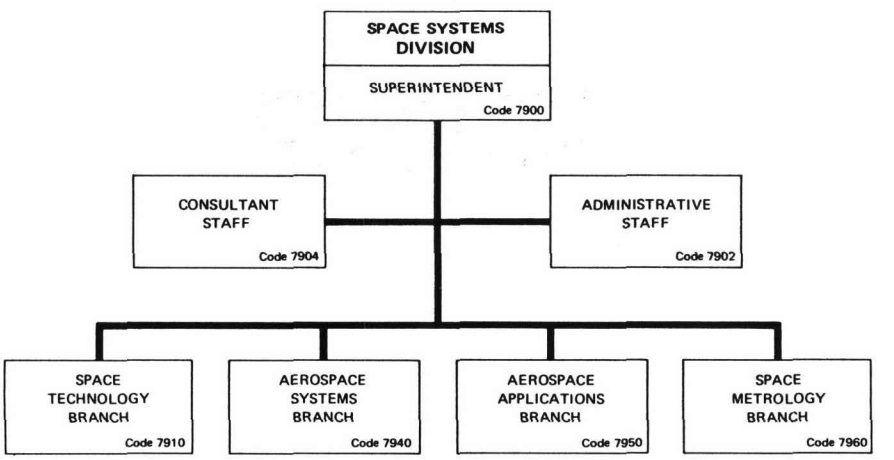
SATELLITE TIMATION

- SPACE TECHNOLOGY
- AEROSPACE SYSTEMS
- AEROSPACE APPLICATIONS
- SPACE METROLOGY

SOLID STATE FACILITY

150-FOOT ANTENNA SUGAR GROVE





Basic Responsibilities

The Space Systems Division is responsible for research and development leading to the design, fabrication, launch, operation, and support of space systems for the Navy. The application of space technology to the naval mission extends through all of the R&D spectrum, from concept formulation to launch techniques of the completed spacecraft and interface with boosters. Both active and passive sensor technology are developed for space use. The Division is also responsible for R&D in environmental problem areas which affect the operation and performance of these space vehicles and for sharing the results with other related activities.

Branches

Space Technology
- Large parabolic antenna systems
- Electromagnetic radiation observations
- Special media propagation
- Electromagnetic exosphere phenomena
- National radio quiet zone

Aerospace Systems
- Ocean surveillance
- Electromagnetic scatter research
- Propagation research

Aerospace Applications
- Data technology and technique
- Space systems engineering
- Systems analysis
- Project management

Space Metrology
- Navigation systems
- Geodesy systems
- Time synchronization
- System analysis

Key Personnel

Name	*Title*
Mr. N.W. Guinard	Acting Superintendent
Mr. J.H. Trexler	Space Technology Branch
Mr. N.W. Guinard	Aerospace Systems Branch
Mr. E.L. Dix	Aerospace Applications Branch
Mr. R.L. Easton	Space Metrology Branch

Personnel Complement

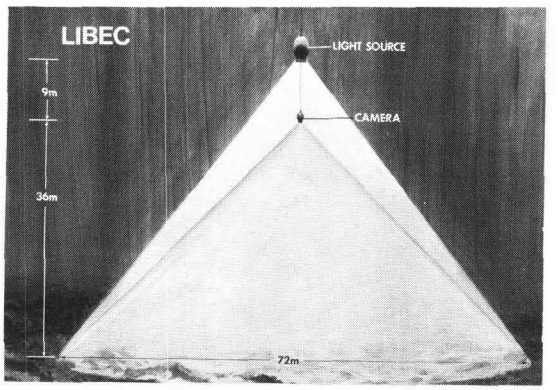
On Board: 115

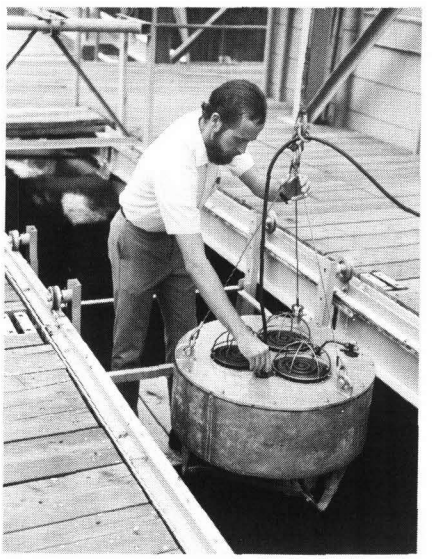
Total Estimated R&D Funding

Fiscal Year 1974: $22,000,000

Oceanology Area

The Naval Research Laboratory conducts research at sea and in the laboratory in the fields of underwater acoustics, oceanography marine geophysics, atmospheric physics, and ocean engineering and technology. Subjects of investigation include antisubmarine warfare, acoustic propagation and scattering, ambient noise in the ocean, signal processing, marine and atmospheric pollution, instrumentation systems for deep ocean search and inspection, and methods of design and installation of structures and apparatus for use in the ocean. NRL also serves as a focal point in the Navy for standardization of underwater sound measurements, and it holds a major responsibility for research and development in undersea acoustic surveillance.





Associate Director of Research for Oceanology

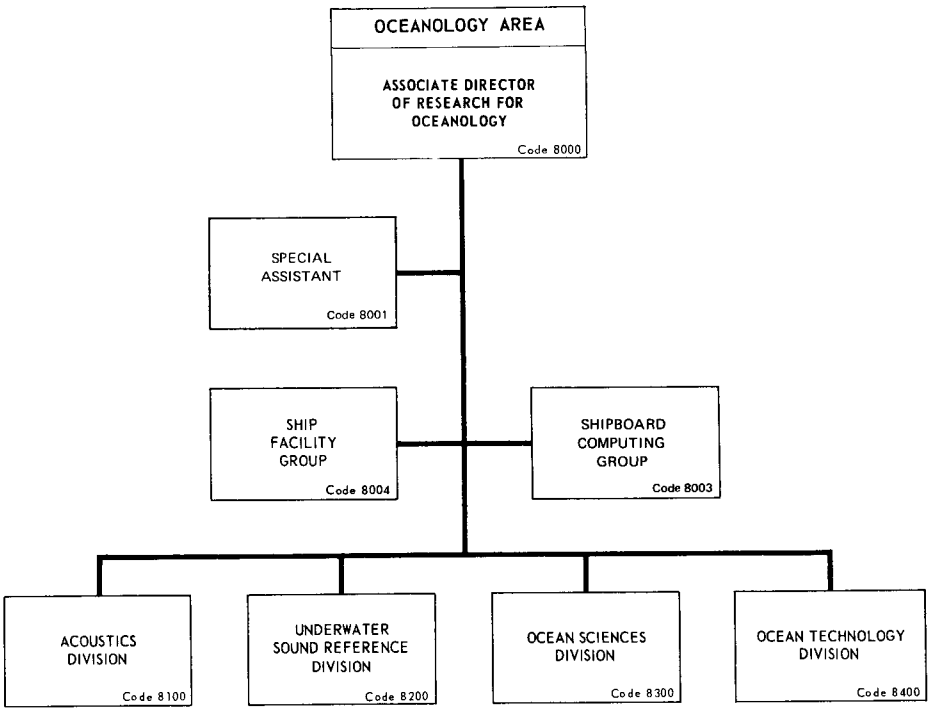
Dr. Ralph R. Goodman

Dr. Goodman [redacted]. He attended the University of Michigan, Ann Arbor, where in 1950 he received a B.S. degree in mathematics, in 1951 a B.S. in physics, in 1952 an M.S. in physics, and in 1958 a Ph.D. in physics.

He began his scientific career at the Navy Electronics Laboratory in 1958, joined the staff of Colorado State University in 1959 as Assistant Professor, and served as a consultant to the Applied Physics Group at the SACLANT ASW Research Center, La Spezia, Italy, from 1961 to 1963. He then returned to Colorado State University, where from 1963 to 1968 he served as Associate Professor and Professor of Physics and, during his last year there, as Acting Chairman of the Department of Physics. He came to NRL with the appointment of Associate Director of Research in September 1968.

Dr. Goodman's research interests are centered on acoustic propagation, scattering, and physical acoustics. He also maintains an active interest in solid state physics.

Dr. Goodman is a member of the American Physical Society, the Acoustical Society of America, the American Geophysical Union, the American Institute of Physics, Sigma Xi, Phi Kappa Phi, and Tau Beta Pi. He was also a member of the Board of Trustees of the Colorado State University Research Foundation and the NAS/NRC Committee on Undersea Warfare.



Key Personnel

Name	*Title*
Dr. R.R. Goodman	Associate Director of Research for Oceanology
Mr. W.L. Brundage	Special Assistant
Mr. D. Steiger	Head, Shipboard Computing Group
Mr. A.L. Gotthardt	Head, Ship Facility Group
Dr. J.C. Munson	Superintendent, Acoustics Division
Mr. R.J. Bobber	Superintendent, Underwater Sound Reference Division
Dr. J.O. Elliott	Superintendent, Ocean Sciences Division (Acting)
Dr. J.P. Walsh	Superintendent, Ocean Technology Division

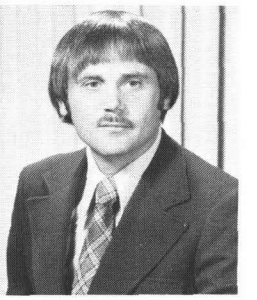
SHIPBOARD COMPUTING GROUP

Basic Responsibilities

The Shipboard Computing Group develops, operates, and maintains computer facilities on NRL research ships. The Group assists experimenters in the use of their measuring equipment and the utilization of the shipboard computer system in the automatic acquisition, reduction and processing of their data. The Group performs this work under the Associate Director of Research for Oceanology.

Key Personnel

Name	*Title*
Mr. D. Steiger	Head, Shipboard Computing Group



Mr. D. Steiger

Personnel Complement

On Board: 6

Total Estimated R&D Funding

Fiscal Year 1974: $130,000

SHIP FACILITY GROUP

Basic Responsibilities

The Ship Facility Group is responsible for coordinating and providing ship services, sea-going facilities, and specialized expertise common to and required by the at-sea experiments of Research Divisions under the Associate Director of Research for Oceanology.

Key Personnel

Name	*Title*
Mr. A.L. Gotthardt	Head, Ship Facility Group

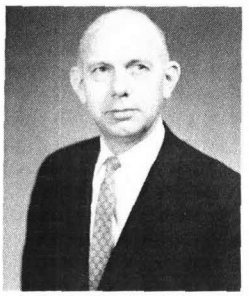
Mr. A. L. Gotthardt

Personnel Complement

On Board: 17

Total Estimated R&D Funding

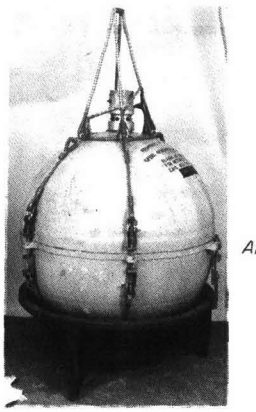
Fiscal Year 1974: $2,822,000



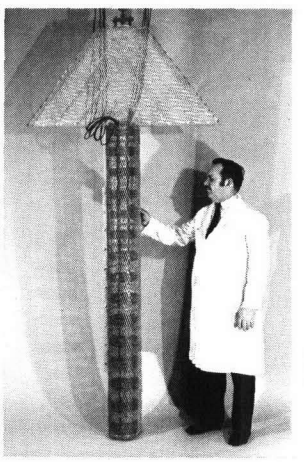
Dr. J. C. Munson

Acoustics Division

- LARGE APERTURE SYSTEMS
- PHYSICAL ACOUSTICS
- TRANSDUCER
- PROPAGATION
- SHALLOW WATER SURVEILLANCE

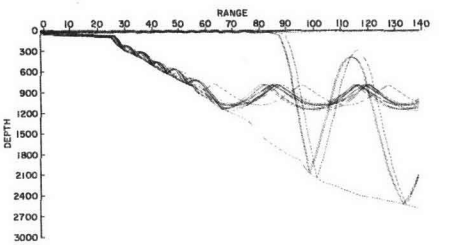


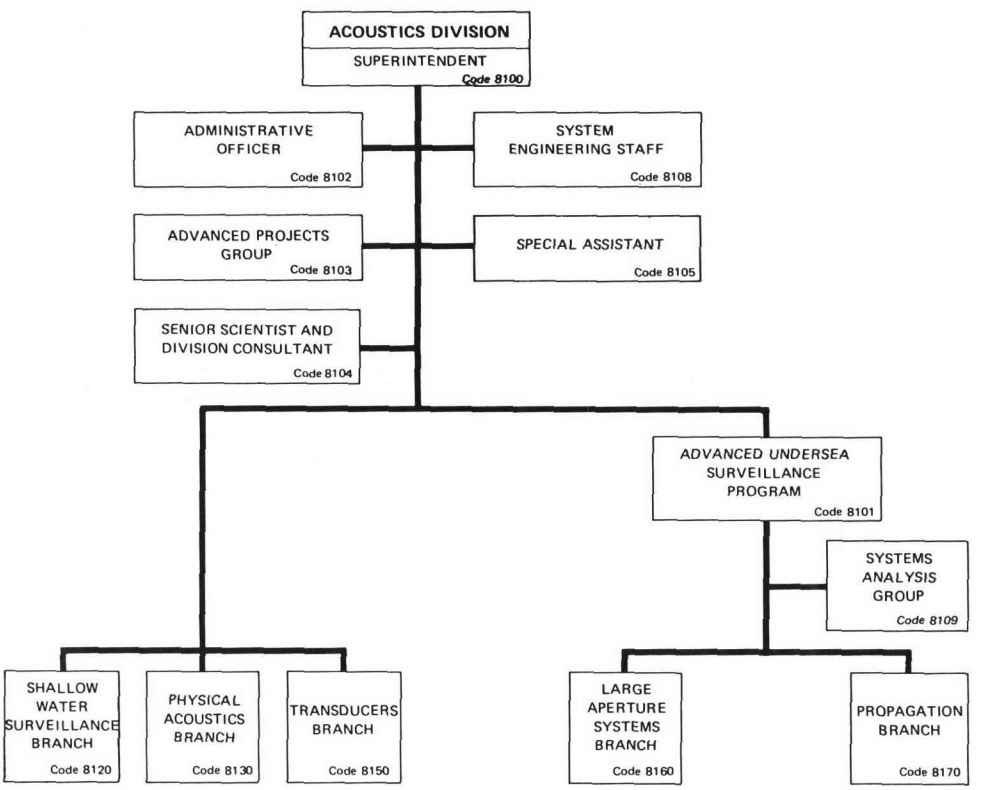
AMBIENT NOISE BUOY



RING TRANSDUCER ARRAY

ACOUSTIC PROPAGATION MODEL





Basic Responsibilities

The Acoustics Division has major responsibilities for basic and applied research and development in the Navy's undersea warfare programs. The spectrum of work covered in the program includes acoustic radiation and transduction, propagation and scattering, environmental prediction, surveillance system concepts, and system analysis. The Division conducts theoretical and experimental research programs in physical acoustics and ocean acoustics; it develops models of the interaction of acoustic energy with the ocean environment and with structures; it conducts experiments in the deep ocean, in acoustically shallow water and in the Arctic. The Division program is heavily oriented toward research and development in support of the undersea surveillance mission but also includes other missions. The Division is supported by an Engineering Staff in the conduct of at sea experiments aboard the USNS HAYES and often uses other ships and aircraft in multiplatform experiments. The Division interacts with research programs outside the Division in areas such as oceanography, deep ocean technology, systems analysis and Fleet operations.

Staff Activities

System Engineering
- Support and ship facility
- Acoustic sources
- Engineering research

Systems Analysis
- Systems studies
- Surveillance systems planning and evaluation

Advanced Projects
- Advanced surveillance systems
- Information processes for underwater acoustics

Branches

Shallow Water Surveillance
- Mode analysis
- Model the signal, noise and reverberation fields
- Source and receiving array configurations
- Signal design and processing requirements

Physical Acoustics
- Ultrasonic investigation of liquids and amorphous solids
- Reflection, diffraction, scattering by bodies
- Target strength modeling
- Light-sound interaction
- Bulk and interface wave properties

Transducer
- Basic radiation theory
- Electroacoustic modeling
- Transducer physical models
- Calibration of large transducer arrays
- Acoustic array calculations

Large Aperture Systems
- Active target detection and classification
- Propagation, coherency, and wave front behavior
- Low frequency monostatic and bistatic reverberation studies
- Propagation models
- Natural and man-made noise
- Microstructure

Propagation
- Long-range propagation models
- Application of long-range low-frequency propagation
- Scattering from ocean bottom, surface, and volume
- Arctic underwater acoustics
- Very low frequency propagation
- Acoustic fluctuations

Key Personnel

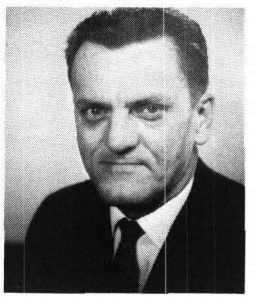
Name	*Title*
Dr. J.C. Munson	Superintendent
Dr. S. Hanish	Senior Scientist and Division Consultant
Mr. R.R. Rojas	Head, Advanced Undersea Surveillance Program
Mr. F.C. Titcomb	Special Assistant to Superintendent
Mr. W.J. Finney	Head, Advanced Projects Group
Mr. A.T. McClinton	Head, System Engineering Staff
Dr. J.C. Knight	Head, Systems Analysis Group
Mr. R.H. Ferris	Head, Shallow Water Surveillance Branch
Dr. C.M. Davis, Jr.	Head, Physical Acoustics Branch
Mr. W.J. Trott	Head, Transducer Branch
Dr. B.B. Adams	Head, Large Aperture Systems Branch
Mr. B.G. Hurdle	Head, Propagation Branch

Personnel Complement

On Board: 138

Total Estimated R&D Funding

Fiscal Year 1974: $6,955,000

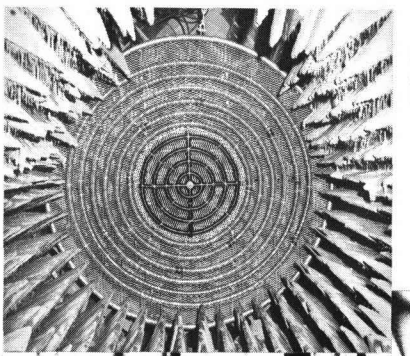


Underwater Sound Reference Division

Mr. R. J. Bobber

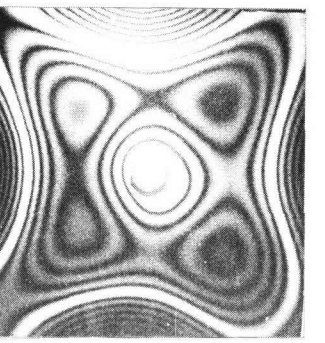
- UNDERWATER ELECTROACOUSTIC MEASUREMENT METHODS
- UNDERWATER ELECTROACOUSTIC STANDARDS
- UNDERWATER ELECTROACOUSTIC MEASUREMENT SERVICES

UNDERWATER SOUND REFERENCE DIVISION, ORLANDO, FLORIDA

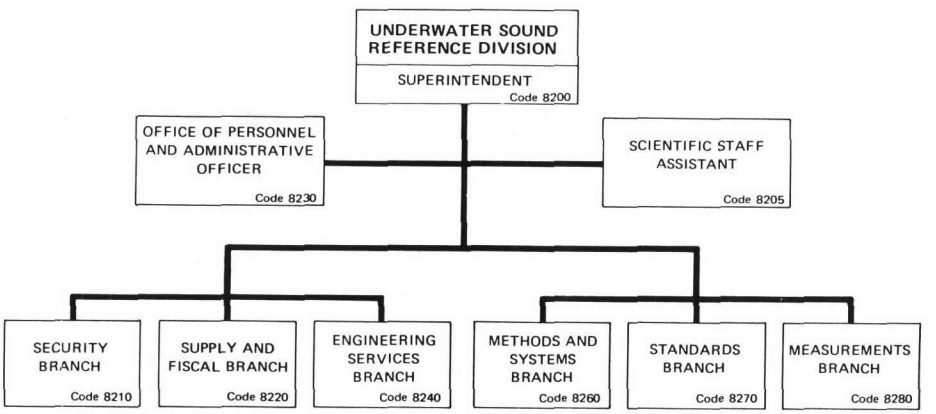


NEAR-FIELD TRANSDUCER ARRAY IN ANECHOIC TANK FACILITY

LEESBURG FACILITY-CALIBRATION BARGE



HOLOGRAM OF VIBRATING TRANSDUCER DIAPHRAGM



Basic Responsibilities

The Underwater Sound Reference Division is a focal point in the Navy for standardization in the science and technology of underwater sound measurements. Its research and development program is aimed at expanding the state of the art and providing Navy in-house expertise. Reference calibration measurements in a large complex of specialized facilities and calibrated standard transducers are available to all naval activities and contractors in support of undersea warfare programs.

Research and Development Branches

Methods and Systems
- Calibration theory and accuracy
- Measurement methods
- Digital and analog systems
- Computerized data reduction
- Signal analysis

Standards
- Acoustic materials
- Electroacoustic standards
- Acoustic sources
- Specialized electroacoustic transducers
- Vibration analysis techniques
- Standard loan services

Measurements
- Standard calibration services
- Sonar transducer test and evaluation
- Measurements on acoustic materials
- Simulated deep-submergence measurements
- Measurement facility development

Key Personnel

Name	*Title*
Mr. R.J. Bobber	Superintendent
Mr. J.M. Taylor	Scientific Staff Assistant
Mr. J.C. Michael	Supply and Fiscal Officer
Vacancy	Personnel and Administrative Officer
Mr. W.W. Carlson	Head, Engineering Services Branch
Mr. A.Z. Robinson	Head, Methods and Systems Branch
Mr. I.D. Groves	Head, Standards Branch
Dr. J.E. Blue	Head, Measurements Branch

Personnel Complement

On Board: 95
(Graded 76, Ungraded 19)

Total Estimated R&D Funding

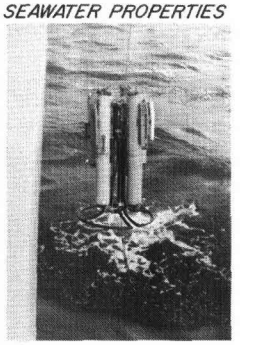
Fiscal Year 1974: $1,806,000

Dr. J. O. Elliot

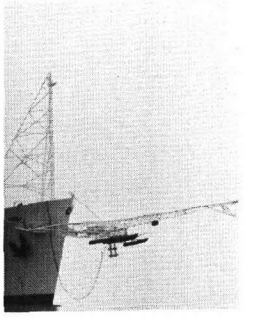
Ocean Sciences Division

- APPLIED OCEANOGRAPHY
- ATMOSPHERIC PHYSICS
- CHEMICAL OCEANOGRAPHY
- PHYSICAL OCEANOGRAPHY
- MARINE BIOLOGY & BIOCHEMISTRY
- NONACOUSTIC ASW

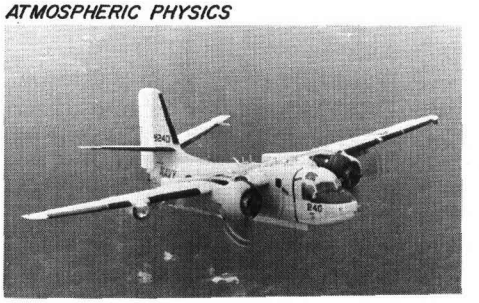
SEAWATER PROPERTIES

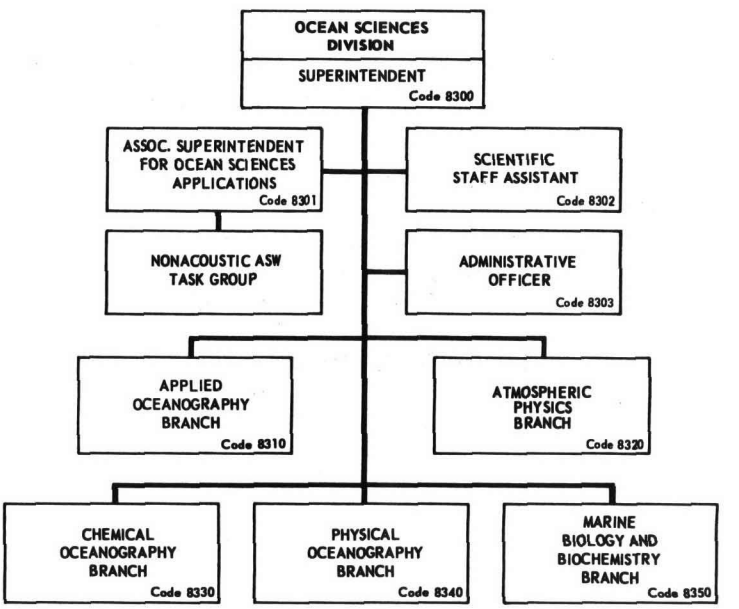


AIR-SEA INTERACTIONS



ATMOSPHERIC PHYSICS





Basic Responsibilities

The Ocean Sciences Division conducts basic and applied research and development in the ocean sciences. Included are studies of the physics, chemistry, and biology of the oceans and atmosphere directed toward an improved understanding and then use as the major operating environments of the Navy. Results lead ultimately to improvement in the design and effectiveness of naval equipment, materials, and systems.

Staff Activity

Nonacoustic ASW (R&D) Task Group

Branches

Applied Oceanography
- Antisubmarine warfare
- Hydrodynamics of submerged bodies
- Radiometric characteristics of the ocean

Atmospheric Physics
- Atmospheric dynamics
- Cloud physics
- Weather instrumentation
- Fog studies

Chemical Oceanography
- Physical and analytical chemistry of seawater, dissolved gases, and marine sediments

Physical Oceanography
- Hydrodynamics and turbulence of the oceans
- Marine geophysics
- Air-sea interactions

Marine Biology & Biochemistry
- Biodegradation in the marine environment
- Marine biochemistry
- Biological oceanography
- Bioluminescence

Key Personnel

Name	*Title*
Dr. J.O. Elliot	Superintendent (Acting)
Dr. J.O. Elliot	Associate Superintendent for Ocean Science Applications
Dr. A.J. Schooley	Senior Research Scientist
Dr. J.M. Leonard	Consultant
Mr. H.L. Clark	Head, Applied Oceanography Branch
Dr. L.H. Ruhnke	Head, Atmospheric Physics Branch
Dr. C.H. Cheek	Head, Chemical Oceanography Branch
Dr. J.M. Witting	Head, Physical Oceanography Branch
Dr. D.W. Strasburg	Head, Marine Biology and Biochemistry Branch

Personnel Complement

On Board: 93

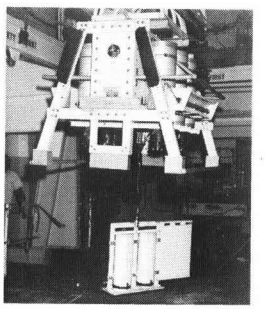
Total Estimated R&D Funding

Fiscal Year 1974: $5,313,000

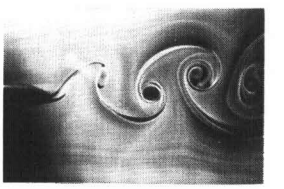
Ocean Technology Division

Dr. J. P. Walsh

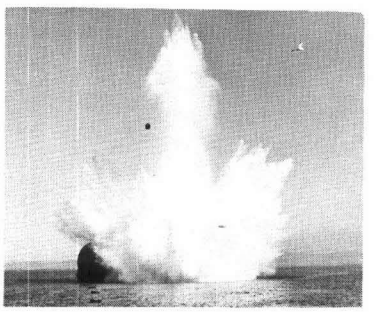
- OCEAN ENGINEERING
- OCEAN MATERIALS CRITERIA
- OCEAN INSTRUMENTATION
- APPLIED MECHANICS
- SHOCK AND VIBRATION INFORMATION CENTER



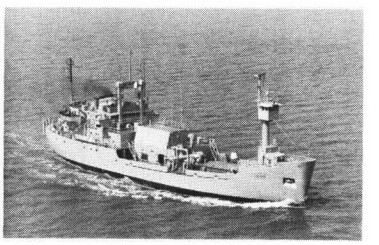
LIBEC



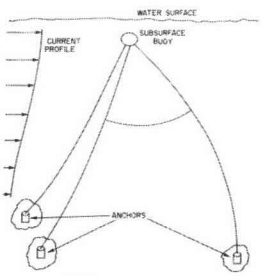
VORTEX SHEDDING FROM A VIBRATING CYLINDER



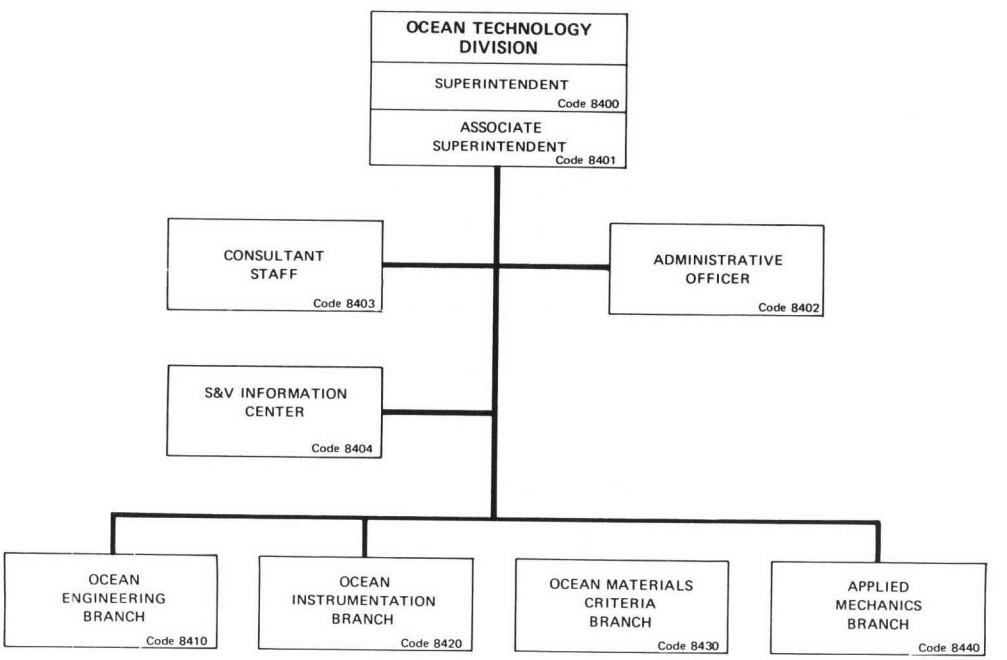
UNDERWATER SHOCK TESTS



MIZAR



CABLE ARRAYS



Basic Responsibilities

The Ocean Technology Division researches, develops, and applied specialized equipment, instrumentation, and techniques for conducting ocean and ocean-floor operations, and it evolves operational technology for advanced systems. The division utilizes advanced materials and design technology for engineering optimization of required equipment. It also conducts research activities in select areas of ocean technology with coupling and support activities related to other ongoing research and development in these and other fields of interest. The DoD Shock and Vibration Information Center is included in the Division; this Center provides a single source for up-to-date information on shock and vibration for scientists and engineers. This Division, in conjunction with other Divisions of NRL and out-of-house agencies, brings the collective expertise to bear on crucial problems.

Staff Activity

S&V Information Center

Branches

Ocean Engineering
- Research and development on ocean systems, subsystems, and components
- Systems engineering
- Design
- Conduct at-sea operations

Ocean Materials Criteria
- Fracture mechanics and fracture strength
- Plastic flowing
- Compression failure mechanisms
- Armor research and development
- Deep submergence materials-structures
- Missile component failure
- Nondestructive testing

Applied Mechanics
- Shipboard shock fundamentals
- Shock protection for weapons systems
- Methods for design against shock
- Fracture mechanics design studies
- Developmental studies of prototypes
- Shock strength of materials
- Hydromechanic studies

Ocean Instrumentation
- Instrumentation analysis, research and development
- Sensors, detectors
- Data and signal processing
- Stress and kinematic quantities measurements

Key Personnel

Name	*Title*
Dr. J.P. Walsh	Superintendent
Mr. C.L. Buchanan	Associate Superintendent
Dr. R.O. Belsheim	Consultant
Mr. H.C. Pusey	Head, S&V Information Center
Mr. G.O. Thomas	Head, Ocean Engineering Branch
Mr. H.A. Johnson	Head, Ocean Instrumentation Branch
Dr. J.M. Krafft	Head, Ocean Materials Criteria Branch
Dr. F. Rosenthal	Head, Applied Mechanics Branch

Personnel Complement

On Board: 76

Total Estimated R&D Funding

Fiscal Year 1974: $5,444,000

The Support Services Department

The Director of Support Services is a Navy Captain with appropriate training and experience; he reports to the Director of NRL. His primary responsibility is the supervision, coordination, and control of the administrative and service operations required in support of the work of the Research Department. Usually, he is the next senior officer to the Director and assumes the responsibilities of and acts for the Director in his absence.

The Director of Support Services is responsible for:

- guiding and coordinating the service divisions of the Laboratory (Engineering Services, Supply, Public Works, Technical Information, and Chesapeake Bay) and also his staff functions (Management Engineer and Patent Counsel) so that services rendered are adequate, prompt, accurate, and economical in the use of men and money.
- implementing, for the Director of NRL, the orders and instructions of higher authority in a manner appropriate to the research environment as manifested in the policies and the organization of the Laboratory.
- being familiar with the scientific program and for following the progress of the scientific efforts of the Laboratory in sufficient detail to ensure that administrative decisions are made which support the scientific program.
- assisting the Director of NRL in maintaining an overall plan of organization for the best direction and control of the Laboratory.
- keeping the Director of NRL advised of matters requiring his attention, decision, or other action; acting for the Director of NRL in the approval of usual or routine matters; for assisting the Director of NRL generally with administrative detail, correspondence, reports, and similar matters.
- formulating, amending, and issuing instructions, policy statements, and procedures approved by the Director of NRL.

The Director of Support Services keeps in constant touch with the Director of Research to ensure that the service units of the Laboratory are providing complete support to the scientific divisions. He coordinates with the Director of Research in the planning and carrying out of administrative actions affecting Research Department organization and personnel; and he maintains a close working relationship with the Chief Staff Officer and officers assigned to him to assure provision of support services in operations conducted by the Chief Staff Officer. He also has direct "line" authority over the heads of special staff and service divisions.

Director, Support Services

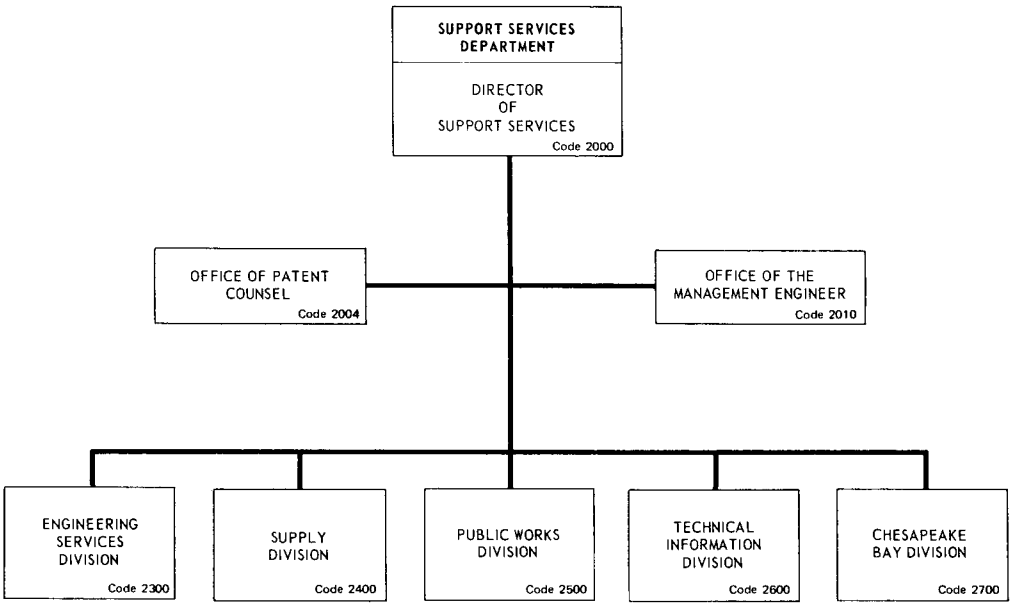
Captain James A. Bortner, USN

Captain Bortner [redacted]. He has had formal education and Navy experience, both as an enlisted man and as a commissioned officer, in physics, mathematics, electronics, naval engineering, and management. He served four years of active enlisted duty with the Naval Reserve, including assignment to the Radio Material School at NRL during World War II.

He remained active with the Naval Reserve while a student at York Junior College and later at Bucknell University in Lewisburg, Pennsylvania. In 1949, he received a B.S. in physics and an M.S. in mathematics from Bucknell and was appointed to its mathematics faculty. He returned to active duty during the Korean conflict and was commissioned as an Engineering Duty Officer (LT/JG) upon graduation from the Officer Candidate School at Newport, Rhode Island, where he stood first in his class. Later he completed a postgraduate course in Naval Construction and Engineering at the Massachusetts Institute of Technology and two postgraduate courses in Management — one at the Naval Postgraduate School and one at the Defense Weapons Systems Management Center, Wright-Patterson AFB, Dayton, Ohio.

As an officer, he has served in key assignments with the Atlantic Reserve Fleet, the Boston Naval Shipyard, the Ship Repair Facility on Guam, M.I., the Pacific Fleet, and the U.S. Naval Academy. In the latter assignment he was Chairman of the Department of Electrical Engineering. Since 1968 he has been with the Naval Ship Systems Command serving in succession as Head of the Ship Communications Branch; Director of the Warfare Systems Division; and Deputy Project Manager, Tactical Electromagnetic Programs.

Captain Bortner is a member of Pi Mu Epsilon, Sigma Pi Sigma, the Society of Naval Architects and Marine Engineers, the American Society of Naval Engineers, and the Armed Forces Communications and Electronics Association.



Key Personnel

Name	*Title*	*Code*
CAPT J.A. Bortner, USN	Director of Support Services	2000
Dr. A.L. Branning	Patent Counsel	2004
Mr. S.L. Cohen	Management Engineer	2010
CDR H.D. Swanson, Jr., USN	Engineering Services Officer	2300
CDR J.R. Webb, SC, USN	Supply Officer	2400
CDR C. Geoly, CEC, USN	Public Works Officer	2500
Mr. W.H. Ramey	Head, Technical Information Division	2600
CDR J.M. Fitts, USN	Chesapeake Bay Division Officer	2700

OFFICE OF THE MANAGEMENT ENGINEER

Basic Responsibilities

The Office of the Management Engineer provides staff support to management officials of the Laboratory in matters of administrative operations, management control, and facilities planning. In addition, the Office conducts the Laboratory's Safety Program (except in the fields of microwave, radiological, and nuclear safety, which are the responsibility of the Radiological and Environmental Protection Staff).

Key Personnel

Name	*Title*
Mr. S.L. Cohen	Management Engineer
Mr. A.M. Toscano	Deputy Management Engineer and Head, Management Engineering Branch
Mr. H. Kennedy	Head, Safety Branch

Personnel Complement

On Board: 16

Mr. S. L. Cohen

OFFICE OF PATENT COUNSEL

Basic Responsibilities

The Office of Patent Counsel provides services concerning inventions, patents, trademarks, copyrights, and other related matters. Patent applications are prepared, filed, and prosecuted on NRL inventions of significance to the Government. The Patent Counsel serves as consultant and adviser on patent and data clauses in R&D and procurement contracts. Assistance is provided the Research Department through state-of-the-art searches in the patent literature pertinent to particular research problems.

Key Personnel

Name	*Title*
Dr. A.L. Branning	Patent Counsel
Dr. P. Schneider	Deputy Patent Counsel

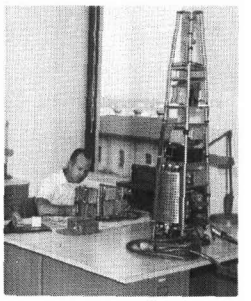
Personnel Complement

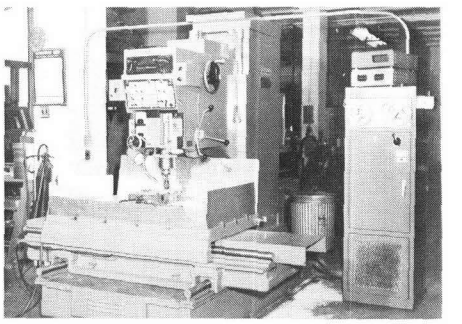
On Board: 22
(Includes NRL and ONR)

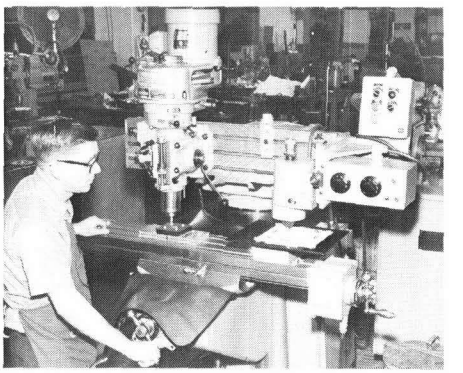
Dr. A. L. Branning

Engineering Services Division

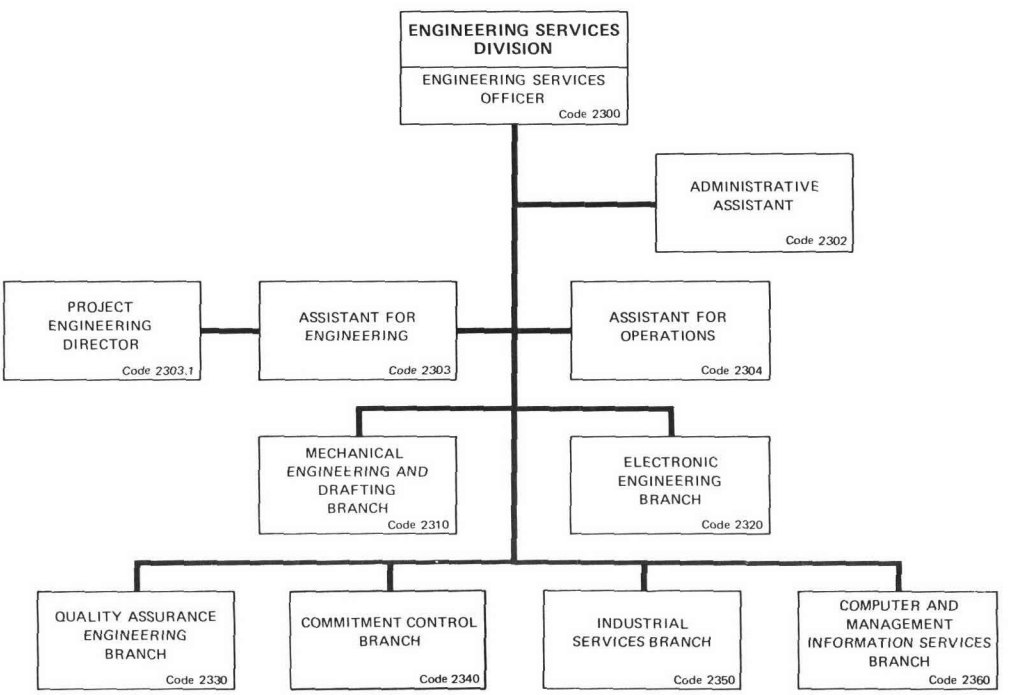
CDR H. D. Swanson, Jr. USN







- MECHANICAL ENGINEERING AND DRAFTING
- ELECTRONIC ENGINEERING
- QUALITY ASSURANCE ENGINEERING
- COMMITMENT CONTROL
- INDUSTRIAL SERVICES
- COMPUTER AND MANAGEMENT INFORMATION SERVICES



Basic Responsibilities

The Engineering Services Division provides the engineering, design, fabrication, assembly, and test of experimental research equipment in support of the Laboratory's research efforts.

Key Personnel

Name	*Title*
CDR H.D. Swanson, Jr., USN	Engineering Services Officer
Mr. P.R. Shifflett	Assistant for Engineering
Mr. J.P. Manning	Assistant for Operations
Mr. M. Shimkus	Head, Mechanical Engineering and Drafting Branch (Acting)
Mr. J. Brotzman	Head, Electronic Engineering Branch
Mr. P.C. Buck	Head, Quality Assurance Engineering Branch
Mr. I.F. Long	Head, Committment Control Branch
Mr. J.L. Leizear	Head, Industrial Services Branch
Mr. L.G. Murphy	Head, Computer and Management Information Services Branch

Personnel Complement

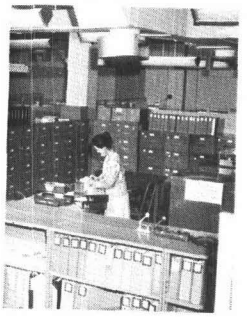
On Board: 488

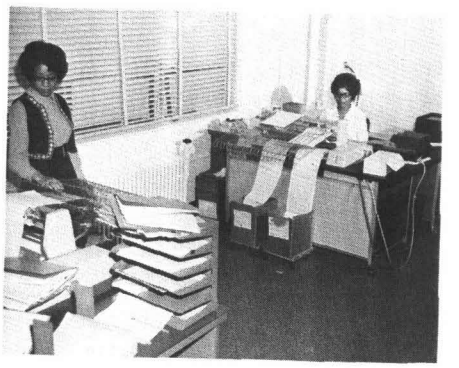
(Graded 162, Ungraded 325, Military 1)

Management & Staff	56
Engineers	37
Technicians	107
Journeymen	204
Machine Operators & Helpers	33
Apprentices	51

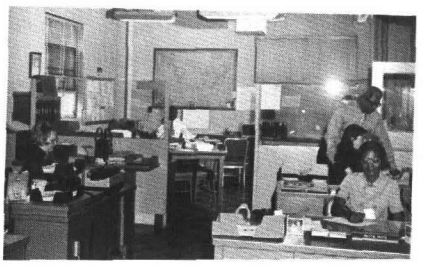
Supply Division

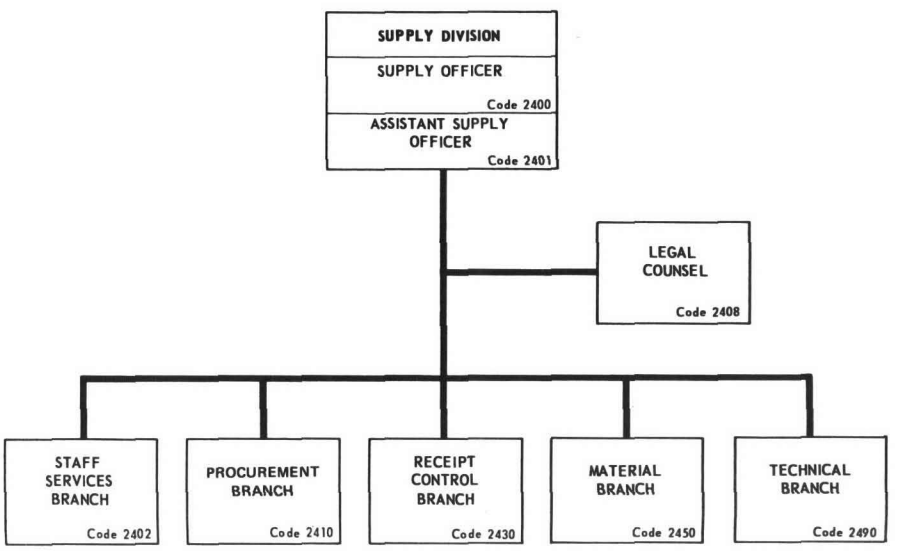
CDR J. R. Webb, USN





- STAFF SERVICES
- PROCUREMENT
- RECEIPT CONTROL
- MATERIAL
- TECHNICAL





Basic Responsibilities

The Supply Division provides service functions to the Laboratory and its field activities, including the operation of Supply issue stores, procurement of equipment, material, and contractual services; receipt, inspection and delivery of material and equipment; storage of inactive laboratory equipment; packing, shipping, and traffic management; and survey and disposal of excess and unusable property.

In addition, Supply offers technical and counseling services to the Research Departments in the development of specifications for a complete procurement package; consultation as needed in the handling of claims against the Laboratory, guidance in the performance stages of contractual services, also transportation and storage problems.

During FY 1973, the Supply Division occupied 190,321 sq. ft. of building space; its stores (six retail and one bulk warehouse) inventory averaged $723,989.00; stores issues totalled $2,113,781.00; disposals totalled $4,125,068.00; and the Procurement Branch processed 40,375 procurement documents totaling $35,431,756.00 on the open-market with an additional 10,148 documents totaling $57,097,738.00 to other Government organizations for a grand total of 40,523 documents totaling $92,529,494.00.

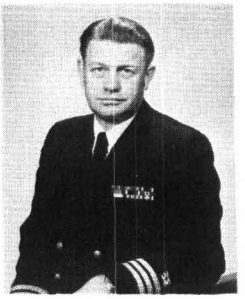
Key Personnel

Name	*Title*
CDR J.R. Webb, SC, USN	Supply Officer
LT R.W. Zeiler, III, SC, USN	Assistant Supply Officer
Mr. A.S. Horton	Legal Counsel
Mr. A.W. Medley, Sr.	Head, Staff Services Branch
Mrs. Margaret M. Moore	Head, Procurement Branch (Acting)
Mrs. V.S. Thomas	Head, Receipt Control Branch
Mr. H.W. Dickinson	Head, Material Branch
Mr. R.R. Black	Head, Technical Branch

Personnel Complement

On Board: 156

(Graded 100, Ungraded 54, Military 2)

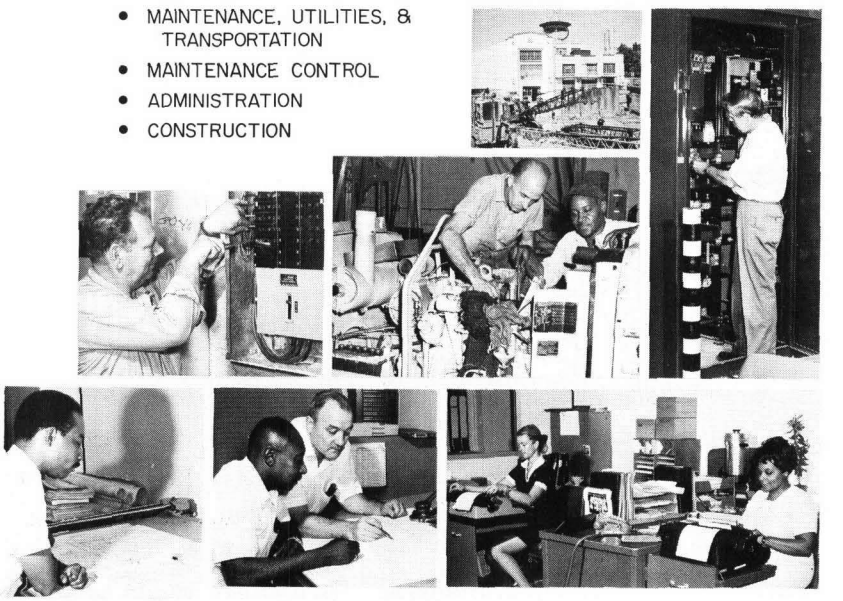


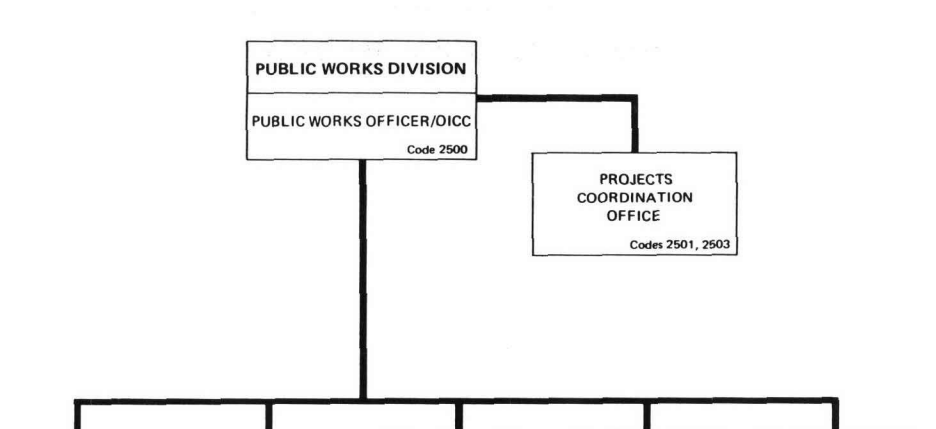
Public Works Divisio1

Public Works Division

CDR A. E. Church, Jr., CEC, USN

- ENGINEERING
- MAINTENANCE, UTILITIES, & TRANSPORTATION
- MAINTENANCE CONTROL
- ADMINISTRATION
- CONSTRUCTION





Basic Responsibilities

The Public Works Division is responsible for the physical plant of NRL. This includes responsibility for the design, construction, operation, maintenance, and repair of all buildings, grounds, roads, utilities, and other structures and activities. Also included are transportation; weight-handling and heavy-construction equipment; heating and refrigeration plants; electric, water, steam, air, and gas supply distribution; telephone communication systems; and sewage disposal.

The Public Works Division provides professional consulting services to the scientific divisions on facilities planning and engineering.

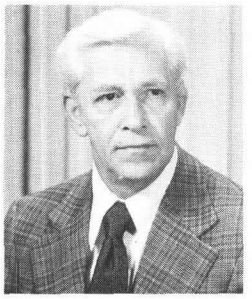
Key Personnel

Name	*Title*
CDR A.E. Church, Jr., CEC, USN	Public Works Officer/Officer in Charge of Construction
LTJG E. Weatherby, III, CEC, USNR	Staff Assistant
Mr. G. Ridings	Projects Coordination
Mr. G.H. Seaver, Jr.	Projects Coordination
Mr. J.R. Lescault	Head, Administrative Branch
Mr. G.L. Hennig	Head, Engineering Branch (Acting)
Mr. L.P. Carpenter	Head, Maintenance, Utilities, & Transportation Branch
Mr. R.O. Weidman	Head, Maintenance Control Branch
Mr. J.B. Canha	Head, Construction Branch

Personnel Complement

On Board: 373

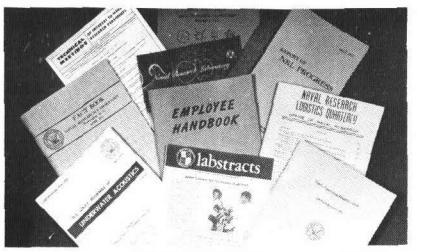
(Graded 52, Ungraded 319, Military 2)

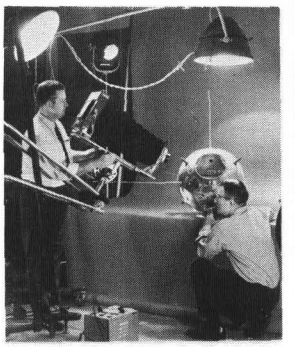


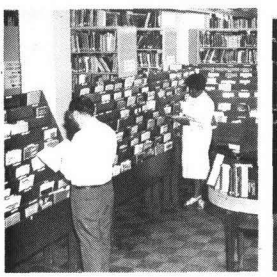
Mr. W. H. Ramey

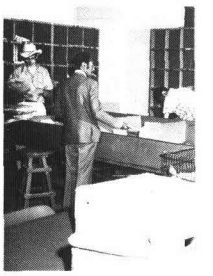
Technical Information Division

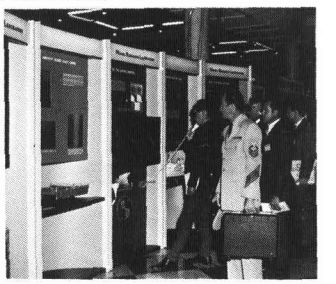
- EDITORIAL
- LIBRARY
- GRAPHIC ARTS
- PERIODICALS
- PUBLIC AFFAIRS
- CORRESPONDENCE AND RECORDS MANAGEMENT

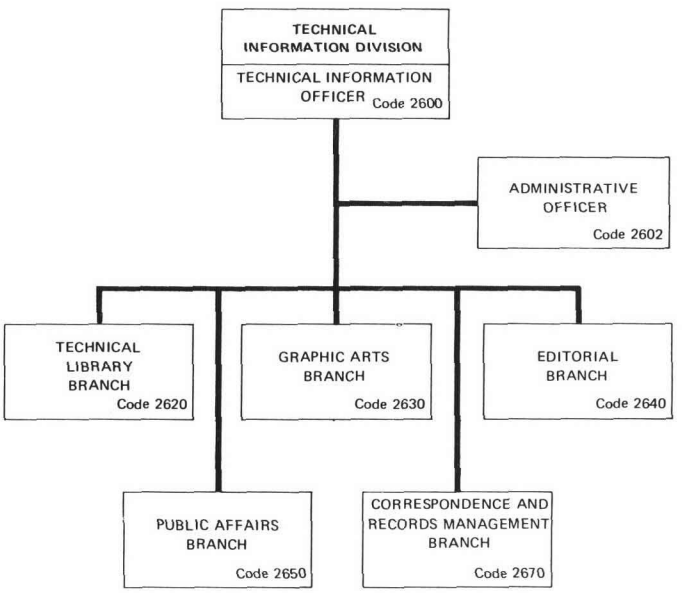












Basic Responsibilities

The Technical Information Division plans and administers the Laboratory's program of preparing and disseminating the results of scientific research through official publications, scientific journals, presentations, films, exhibits, and news media. It provides centralized professional services to both NRL and ONR in writing, editing, printing, exhibits, photography, graphic arts, public affairs, documentation, language-translations, and mail-records services. It operates one of the Navy's largest integrated technical libraries with holdings of 200,000 bound volumes and 350,000 technical reports.

Key Personnel

Name	*Title*
Mr. W.H. Ramey	Head, Technical Information Division
Mrs. D.E. Cameron	Administrative Officer
Mrs. D.P. Baster	Librarian
Mr. W.H. Ramey	Head, Graphic Arts Branch
Mr. W.M. Leak	Head, Editorial Branch
Mr. J.E. Sullivan	Head, Public Affairs Branch and Public Affairs Officer (Acting)
Mrs. L.V. Dabney	Head, Correspondence and Records Management Branch

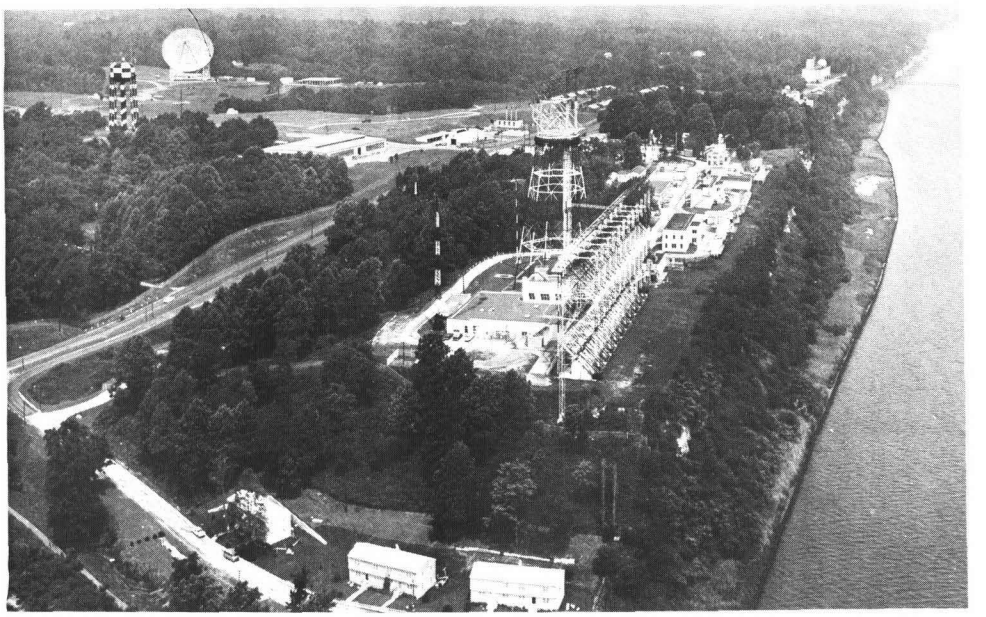
Personnel Complement

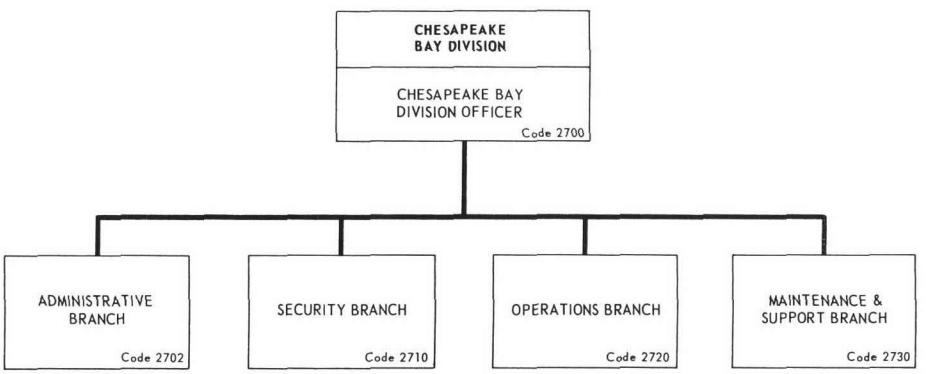
On Board: 163

(Graded 144, Ungraded 19)

Chesapeake Bay Division

CDR J. M. Fitts, USN





Basic Responsibilities

The Chesapeake Bay Division provides and maintains facilities and services for test, development and evaluation of radar, radio, and fire control equipment. It also services and supports all research projects conducted at the Chesapeake Beach and Tilghman Island complexes of NRL.

The Physical Plant

Located in a relatively clear area away from any congestion or industrial interference, the main site, at Chesapeake Beach, covers 174.9 acres containing 200 structures of various size and construction, 6 of which are major laboratory buildings. There is over 200 ft of usable dock space with a water depth of 4 to 7 ft, located 2 miles north of the main site. Off-site facilities include the Tilghman Island Facility, located directly across the Bay from CBD at a distance of about 10 miles; the Theodolite House, at North Beach; and the Off-Shore Platform, approximately 2 miles southeast of CBD in the Bay.

Research watercraft available at CBD include one 60-ft catamaran, one 45-ft modified aviation rescue boat, and one 36-ft motor boat. These are used in support of research projects and for transportation between off-site facilities. Housing includes 24 public quarters.

Key Personnel

Name	*Title*
CDR J.M. Fitts, USN	Division Officer
Mr. M.J. Hamor	Administrative Officer
Mr. A. McKamey	Security Officer
BMCM F. McGinnis, USN	Operations Officer
Mr. R.M. Conlyn	Station Engineer

Research Division Representatives

Optical Sciences Division

Mr. A.C. Grosvenor, Optical Science Division Representative
Mr. T.H. Cosden, Applied Optics Branch

Radar Division

Mr. D.C. Rohlfs, Radar Division Representative and Radar Techniques Branch
Mr. M.W. Lehman, Special Projects Representative
Mr. P.W. Ward, Target Characteristics Branch

Plasma Physics Division

Mr. L.T. Humphreys, Plasma Physics Division Representative

Personnel Complement

On Board: 92

(Graded 39, Ungraded 51, Military 2)

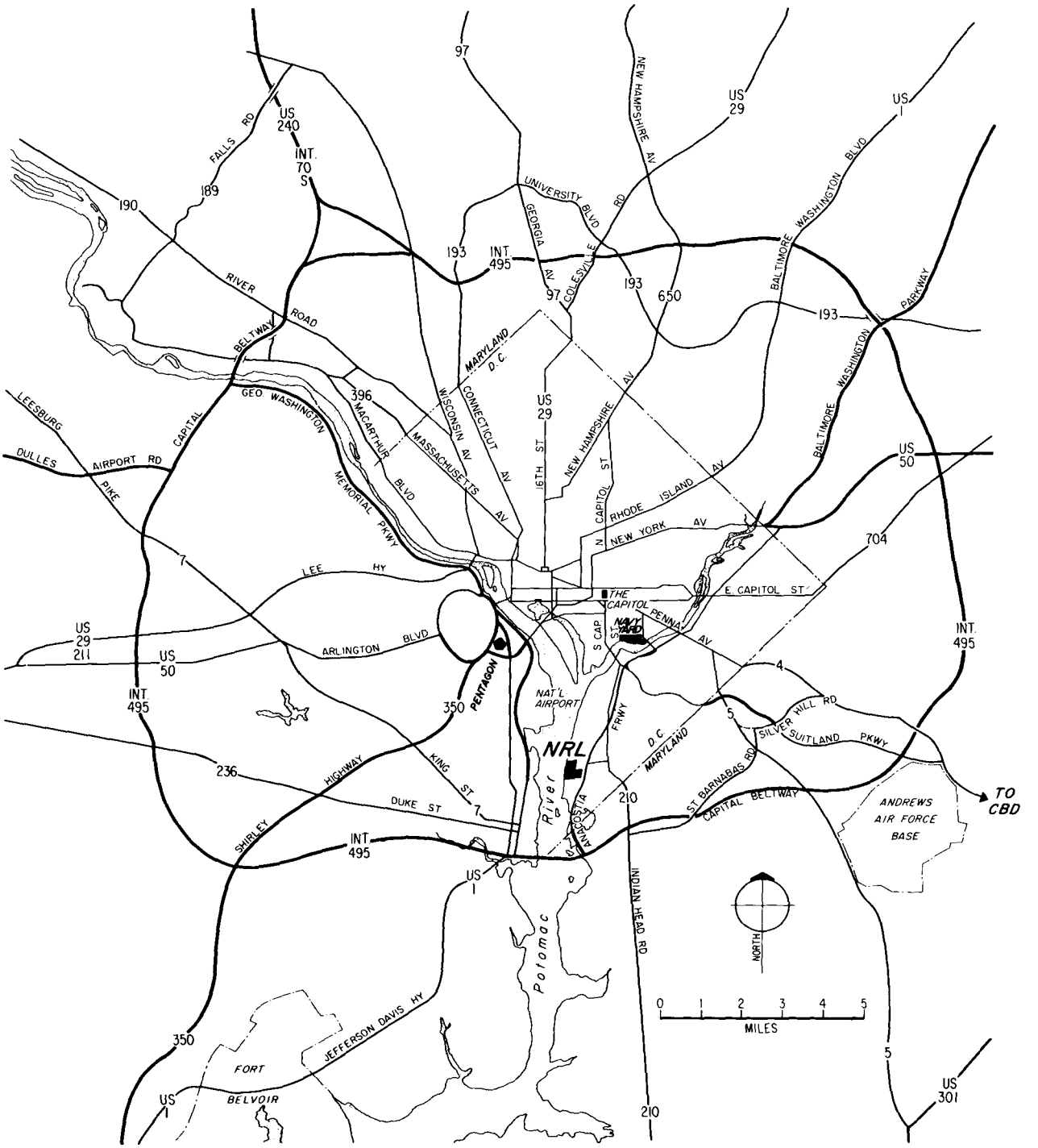
Awards Received by Civilian Employees

As of September 1, 1973

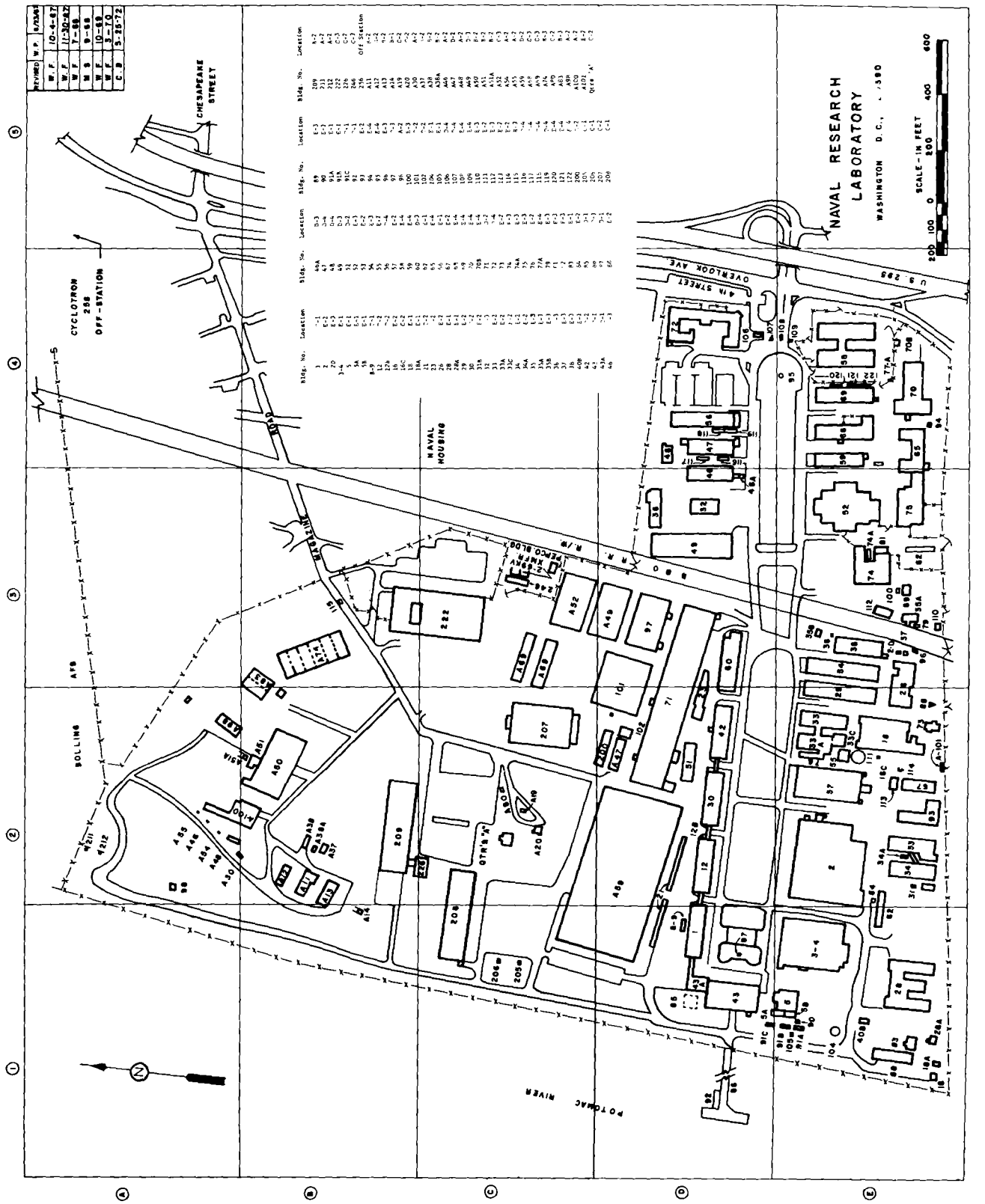
Government Awards	Number
Chair of Science Award (local NRL Award)	4
Department of Defense Certificate of Merit	1
Department of Defense Distinguished Civilian Service Award	5
E.O. Hulburt Annual Science Award (local NRL Award)	18
Federal Woman's Award	1
NASA Scientific Achievement Medal	1
National Medal of Science from the President of the United States	1
Navy Award for Distinguished Achievement in Science	4
Navy Captain Robert Dexter Conrad Award	6
Navy Distinguished Civilian Service Award	60
Navy Meritorious Civilian Service Award	197
Navy Superior Civilian Service Award	38
The Certificate of Merit from the President of the United States	11
The Medal of Merit from the President of the United States	1
The President's Award for Distinguished Federal Civilian Service	2
Non-Government Awards	
A.G. Bissell Memorial Award	1
A.K. Doolittle Award	1
Albert A. Michelson Award of the Franklin Institute	1
Albert Sauveur Achievement Award	1
American Nuclear Society Special Award	1
Ancel Prize of the French Photographic Society	1
Annual Award of the Society for Applied Spectroscopy	2
Applied Science Award of the Scientific Research Society of America	22
Arthur S. Fleming Award of the Washington Chamber of Commerce	3
Award in the Mathematical Sciences of the Washington Academy of Sciences	1
Award for Technical Achievement of the American Society of Mechanical Engineers	1
Award in the Physical Sciences of the Washington Academy of Sciences	4
Award of Merit of the American Society for Testing and Materials	1
Brazilian Legion of Naval Merit	1
Burgess Memorial Award of the American Society for Metals	2
Burgess Memorial Lecture of the American Society for Metals (Washington Section)	1
Burgess Prize Award of the American Society for Metals	2
Charles B. Dudley Medal of the American Society for Testing Materials	4
District Meritorious Certificate Award of the American Welding Society	1
Dryden Research Award of the American Institute of Aeronautics and Astronautics	1
E. Edward Pendray Award of the American Rocket Society	1
Eddington Medal of the Royal Astronomical Society (Great Britain)	2
Engineering Science Award of the Washington Academy of Sciences	2
Frank Booth Award — International Power Sources Symposium	1
Frederic Ives Award of the Optical Society of America	2
George Kimball Burgess Memorial Award	1
Gold Medal Award of the American Society of Naval Engineers	1
Harry Diamond Award of the Institute of Radio Engineers	4
Henry Draper Medal of the National Academy of Sciences	1
Hillebrand Prize of the American Chemical Society	3
James H. Wyld Memorial Award of the American Rocket Society	1
John Adam Fleming Award by the American Geophysical Union of the National Academy of Sciences — National Research Council	1
John A. Penton Gold Medal of the American Foundrymen's Society	1
Joseph S. Seaman Gold Medal Award of the American Foundrymen's Society	1
Kendall Company Award of the American Chemical Society	1

Non-Government Awards (Continued)	Number
Kratel Award of the Eurocontamination Foundation	1
Janssen Medal of the French Photographic Society	1
John Scott Medal of the City of Philadelphia	1
M. Barry Carlton Award Institute of Electrical & Electronics Engineers	1
Marcus A. Grossman Award — American Society of Metals	2
Mayo D. Hersey Award of the American Society of Mechanical Engineers	1
Medal of Honor Award of the Institute of Radio Engineers	2
Morris Liebman Memorial Prize of the Institute of Radio Engineers	1
National Capital Award of the D.C. Council of Engineering and Architectural Societies	3
National Civil Service League Career Service Award	1
National Award of the American Society of Lubrication Engineers	1
Notre Dame Centennial Award	2
Outstanding Americans Foundation Award	1
Patrons Award of the Institute of Radio Engineers	2
Pittsburgh Spectroscopy Award of the Spectroscopy Society of Pittsburgh	1
Professional Achievement Award of the D.C. Council of Engineering and Architectural Societies	1
Progress Award of the Photographic Society of America	1
Pure Science Award of the Scientific Research Society of America	22
Reliability and Quality Control Award of the Radio Engineers Professional Group	2
Rockefeller Public Service Award	1
Sam Tour Award	2
Service Award of the Chemical Society of Washington	1
Service to Mankind Award of the Washington Sertoma Award	1
Society of Technical Writers & Publishers — Washington, D.C. Chapter	1
Society of Women Engineers Achievement Award	1
Space Science Award of the American Institute of Aeronautics & Astronautics	1
Stuart Ballantine Medal of the Franklin Institute of Pennsylvania	2
Trent — Credo Award — Acoustical Society of America	1
Victor K. LaMer Award for Outstanding Graduate Research in Colloid & Surface Chemistry	1
William Blum Award of the Washington-Baltimore Electrochemical Society	3
William Hunt Eisenman Medal	1

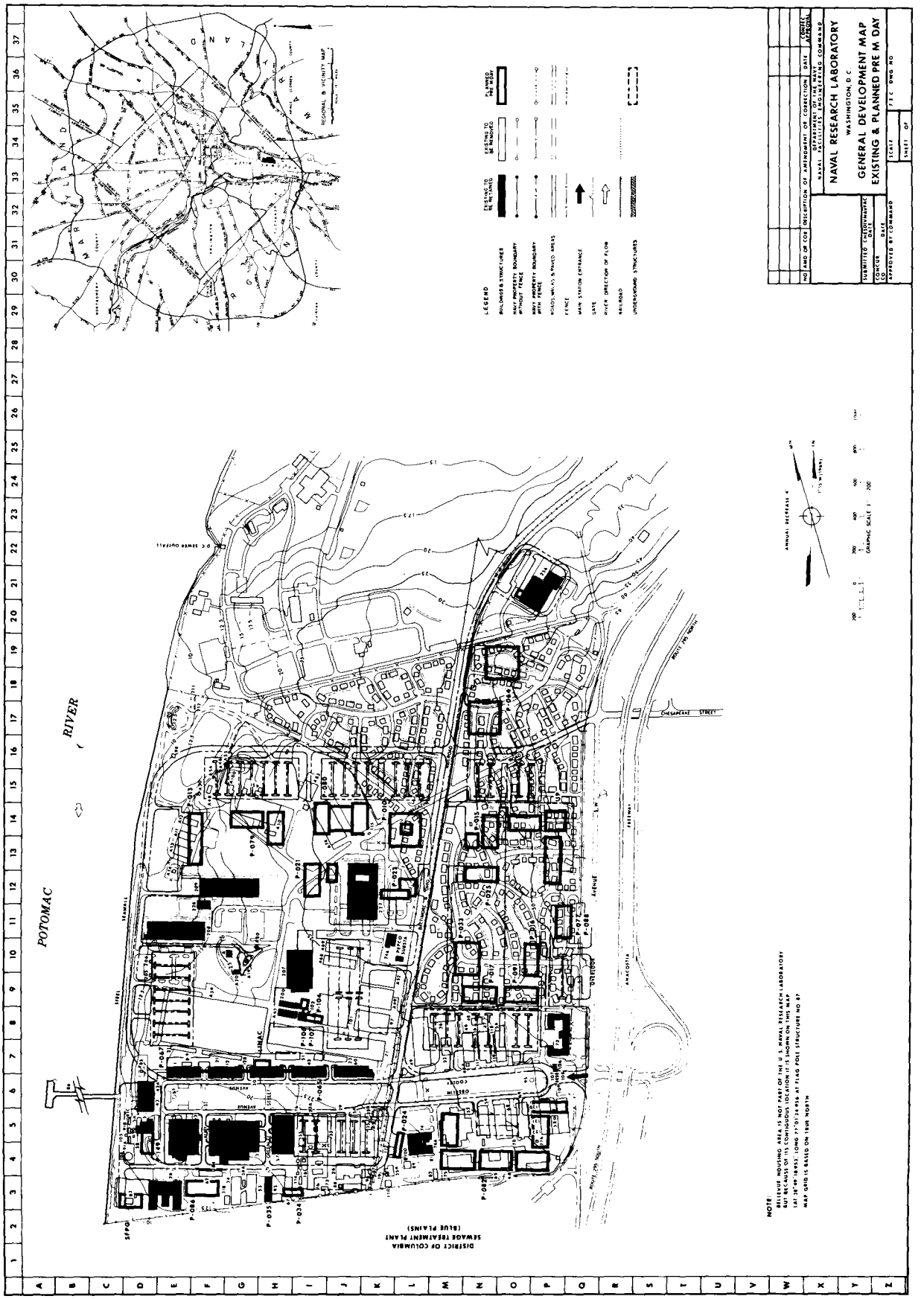
Location of NRL



Location of Buildings at Main Site



General Development Plan



Listing of NRL Sites and Facilities

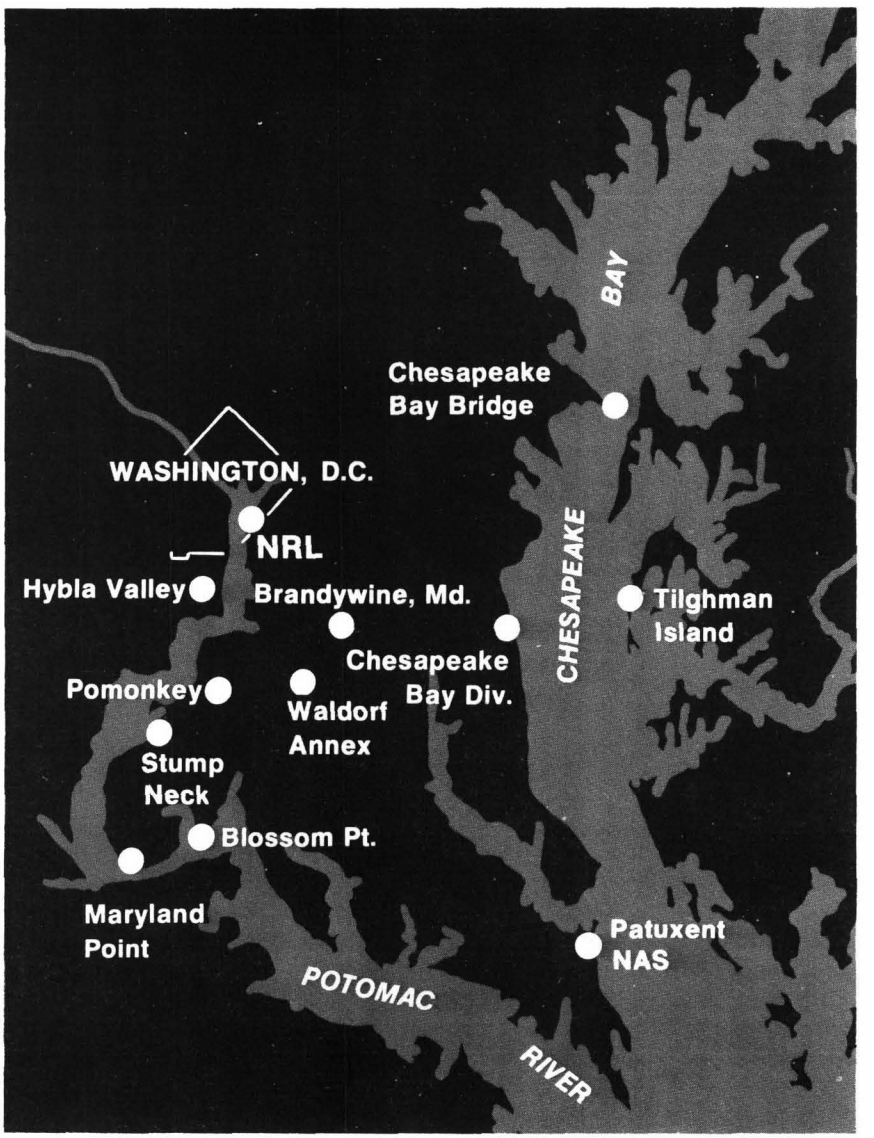
January 1, 1974

Station and Location	Acreage			Class I & II Plant Account	
	Fee Title	Easement or Purchase	Permit or Lease	Value	No. of Buildings and Structures
Naval Research Laboratory, Washington, D.C.	129.23		1.29	59,892,776	141
Cyclotron Building Site Bolling Air Force Base, D.C.			5.24	3,611,297	1
Radio Research Site Coast Guard Radio Station, Alexandria, Va.			55.40		
Radio Test Area, Hybla Valley, Va.	1,262.46			60,000	
A&A Test Site, Shenandoah National Park, Luray, Va.			NA		
Coast Guard Station, Va. Beach			NA		
NRL Flight Support Detachment, Naval Air Station, Patuxent River, Md.			NA		
Chesapeake Bay Division, Chesapeake Beach, Md.	174.90			10,386,782	178
Multiple Research Site, Tilghman Island, Md.	2.00			110,662	9
Dock Facility, Chesapeake Bay, Md.			0.60	18,533	5
Theodolite Station, North Beach, Md.			0.29	800	1
Tunnel under Maryland State Road 261			NA		
Optics Research Platform in the Chesapeake Bay, Md.			0.23	1,500	2
Research Platform, Chesapeake Bay Bridge, Md.				21,400	1
2 Foghorn Platforms, Chesapeake Bay Bridge, Md.			NA		
Research Gondola, Chesapeake Bay Bridge, Md.			NA		
NRL Waldorf Annex, Md.	23.94	35.16		1,291,301	35
Radio Astronomy Observatory, Maryland Point, Md.	24.30		197.88	247,002	12
Radio Antenna Range, USAF Receiver Site, Brandywine, Md.			22.98		
Radio Research Site, Stump Neck Annex, Naval Ordnance Station, Indian Head, Md.			5.90		
Free Space Antenna Range, Pomonkey, Md.	14.12	28.40		736,508	12
Navy Radio Research Station, Sugar Grove, West Va.				74,091	2
Satellite Tracking Facility, Blossom Point, Md.			23.00		
Edgewood Arsenal, Md.			NA		
*Satellite Tracking Station, Raymondville, Texas	171.55	2.85		1,206,770	16
Underwater Sound Reference Division, Orlando, Fla.	10.46			1,242,389	32
USRD, Leesburg Facility, Bugg Spring, Fla.			6.92	167,067	7
Marine Corrosion Laboratory, Key West, Fla.			NA		
*Underwater Track Facility Argus Island (near Bermuda)			NA		
Research Site, Wayne County, West Va.			NA		
Berthing for USNS HAYES and MIZAR, GSA Pier, Alexandria, Va.			NA		
Totals:	1,812.96	66.41	319.73	77,550,969	

*Now being screened for disposal

Location of Principal Field Stations

Another station is located at Sugar Grove, W. Va. The Underwater Sound Reference Division is located at Orlando, Fla.



Research Platforms

Aircraft

1. The S2D (BUNO 149240) contains specially installed equipment and wing mounted pods for cloud physics research. It is also used in chaff research and for short-term experiments compatible with space limitations of the aircraft.

2. The EC-121K (BUNO 128324) is used for wave propagation studies in the four-frequency radar system.

3. The EC-121K (BUNO 135753) is used for research in cloud physics, ECM, low-frequency radar, and various projects requiring minimal aircraft conversion.

4. The EC-121K (BUNO 141297) is used mainly by the Tactical Electronic Warfare Division to experiment, evaluate, and improve Fleet electronic warfare capabilities.

5. The P3A (BUNO 149670) is primarily used for airborne radiometric studies and to a lesser degree for cloud physics and acoustic research.

Available Ships

1. USNS MIZAR (T-AGOR-11) — Under operational control of MSCLANT. Scheduled by NRL.
2. USNS HAYES (T-AGOR-16)
   (Will use the inherent catamaran design to accomplish oceanographic and acoustics research at sea)
3. Fleet units are regularly scheduled for NRL in support of CNO assigned projects by OPTEVFOR.

DIRECTORY OF KEY OFFICES AND PERSONNEL

Code	Office and Incumbent		Ext.
	OFFICE OF DIRECTOR		
1000	Director	CAPT J T Geary	73403
1001	Executive Assistant	Mr S L Cohen	73231
1003	EEO Coordinator	Mr W H Webster	72486
1005	Public Affairs Officer	Mr J E Sullivan*	72541
1200	Chief Staff Officer	CAPT J M Brozena	73621
1226	Security Section	CDR L R Marshall*	73711
1300	Comptroller	Mr R Showman*	73405
1800	Director of Civ. Pers.	Mr F D Wallace	73421
1810	Employment	Mr D J Blome	73030
	SUPPORT SERVICES DEPARTMENT		
2000	Director of Support Services	CAPT J A Bortner	72879
2300	Engineering Services Officer	CDR H D Swanson, Jr	72300
2400	Supply Officer	CDR J R Webb	73446
2500	Public Works Officer	CDR A E Church, Jr	73371
2600	Head Tech. Info. Div.	Mr W H Ramey	73388
2700	Chesapeake Bay Div. Officer	CDR J M Fitts	
	(CBD Interdepartmental Dial System Tel. No. is 1220-201, Outside Tel. No. is Area Code 301-257-2111)		
	RESEARCH DEPARTMENT		
4000	Director of Research	Dr A Berman	73301
4010	Research Program Office	Mr A Hollings	73081
5000	Assoc. Director of Research for Electronics	Dr J L Allen	73324
5200	Electronics Div. Supt.	Mr A Brodzinsky	73525
5300	Radar Div. Supt.	Mr J H Dunn*	72936
5400	Commun. Science Div. Supt.	Dr B Wald	72903
5500	Optical Sciences Div. Supt.	Dr W R Sooy	73171
5700	Tactical Elect. Warfare Div. Supt.	Mr L A Cosby	72191
6000	Assoc. Director of Research for Materials and General Sciences	Dr J H Schulman	73566
6030	Lab for Structure of Matter	Dr J Karle	72665
6050	Lab for Chemical Physics	Dr W A Zisman	73546
6100	Chemistry Div. Supt.	Dr R E Kagarise	73026
6300	Metallurgy Div. Supt.	Mr W S Pellini	72926
6400	Solid State Div. Supt.	Dr C C Klick	73351
6600	Nuclear Sciences Div. Supt.	Dr J McElhinney	72931
7000	Assoc. Director of Research for Space Science and Technology	Dr H Rabin	72964
7020	Lab for Cosmic Ray Physics	Dr M M Shapiro	72965
7030	Advanced Projects Office Mgr.	Mr R D Mayo	72043
7040	Spacecraft Technology Center	Mr P G Wilhelm	72073
7100	Space Science Div. Supt.	Dr H Friedman	73363
7700	Plasma Physics Div. Supt.	Dr R Shanny	72723
7800	Math. and Info. Sciences Div. Supt.	Dr P B Richards	72044
7900	Space Systems Div. Supt.	Mr N W Guinard*	73468
8000	Assoc. Director of Research for Oceanology	Dr R R Goodman	73294
8100	Acoustics Div. Supt.	Dr J C Munson	73482
8200	Underwater Sound Ref. Div. Supt.	Mr R J Bobber	
	(Area Code 305-859-5120 or via AUTOVON NTC 791-4111)		
8300	Ocean Sciences Div. Supt.	Dr J O Elliot	72974
8400	Ocean Technology Div. Supt.	Dr J P Walsh	73314

*indicates acting

MISCELLANEOUS

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Information, Naval Research Laboratory 73200
AUTOVON, Incoming 29-(Ext.)
IDS, Incoming 19-(Ext.)
Direct in Dialing (Area Code 202) 76-(Ext.)
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Washington, D.C. 20375